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JULY, 1926

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Contractors *and* Engineers' Monthly

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See page 45



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CONTRACTORS' & ENGINEERS' MONTHLY



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ORTON
CRANE & SHOVEL CO.

VOL. XIII. No. 1

CONTRACTORS' & ENGINEERS' MONTHLY

July, 1926

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Where to Purchase

A comprehensive classification of the leading machinery and supply manufacturers arranged for the convenience of contractors, engineers and public officials who may wish to secure information about construction equipment. The Index to Advertisers faces the inside back cover. When writing to advertisers please mention the CONTRACTORS' & ENGINEERS' MONTHLY. A star (*) before the manufacturer's name indicates that his advertisement appears in this issue.

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- *Nove Engine Co., Lansing, Mich.
- *O. K. Clutch & Mach. Co., Columbia, Pa.
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- *Stover Mfg. & Eng. Co., Freeport, Ill.
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- United Iron Wks., Kans. City, Mo.
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- Sinclair Ref. Co., Chicago.
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- *Gallen Iron Wks. & Mfg. Co., Gallen, O.
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BLASTING POWDER (See Explosives)

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- *Western Block Co., Lockport, N. Y.
- Upon-Walton Co., Cleveland, O.

* Indicates that the manufacturer carries an advertisement. See index facing inside back cover.*

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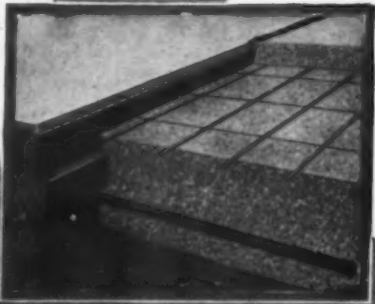
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*Gallion Ir. Wks. & Mfg. Co., Gallion, O.
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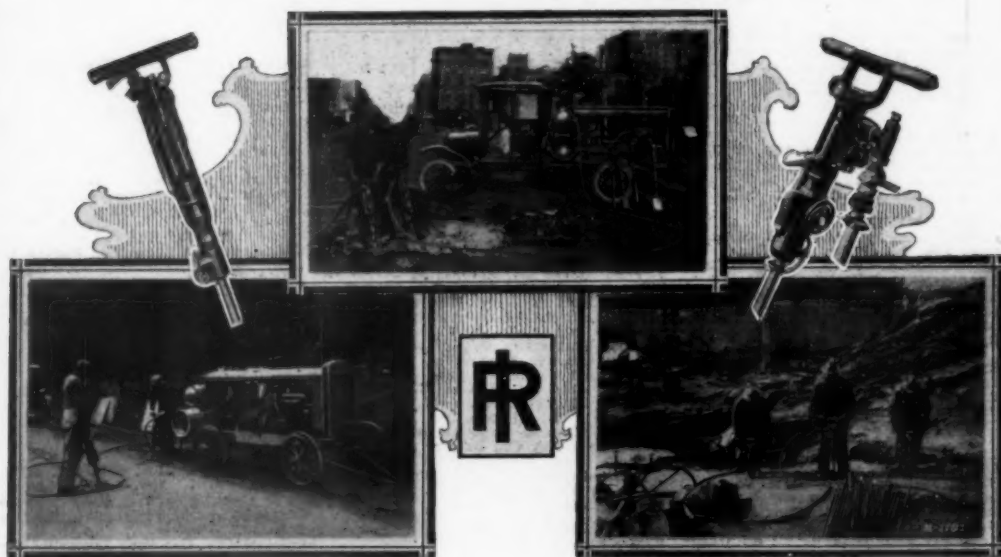


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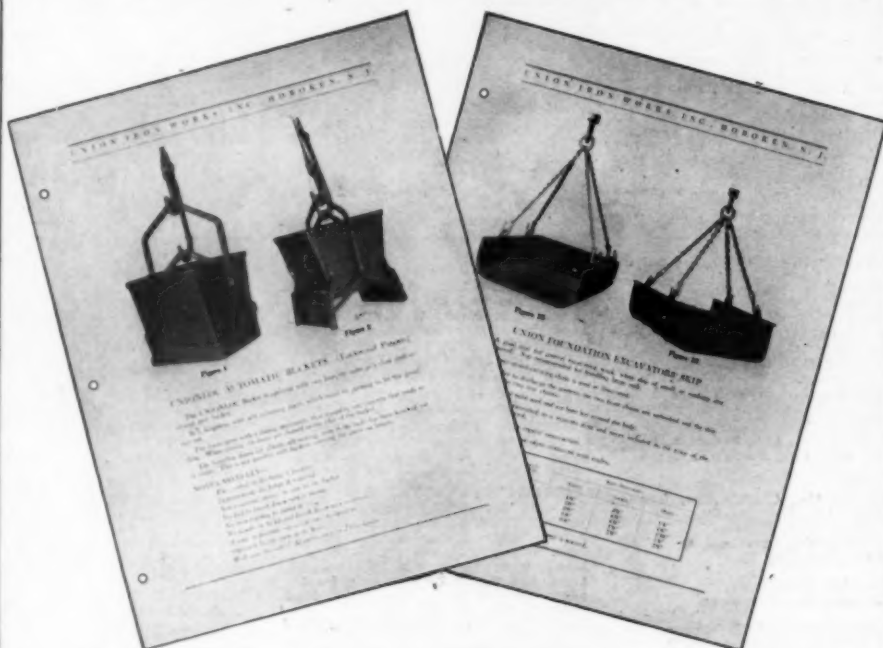
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 - Mandt Co., Keokuk, Ia.
 - Martin-Parry Corp., York, Pa.
 - Pechstein Iron Works, Keokuk, Ia.
 - Thompson Mfg. Co., Williston, S. C.
 - Van Dorn Iron Wks., Cleveland, O.
- FORD MOTOR PUMPER**
- *American Steam Pump Co., Battle Creek, Mich.
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- Roderick Lean Mfg. Co., Mansfield, O.
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- *Fuller & Sons Mfg. Co., Kalamazoo
 - *Waukegan Stl. Tank Co., Waukegan, Wis.
 - *Warford Corp., N. Y.
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 - Rackstell Sales & Mfg. Co., N. Y.
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Where the material has to be moved in a hurry over rough ground, the Trackson-equipped Fordson does it at lowest cost.

Its great track area takes the loads over the soft loose rough ground of the dumping grounds, through mud and sand, with no danger of getting stuck.

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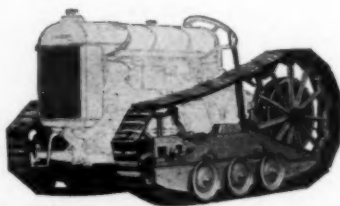
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Wayne Iron Wks., Wayne, Pa.

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Cleveland Pneum. Tool Co., Cleveland, O.
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Johns-Manville, Inc., N. Y.

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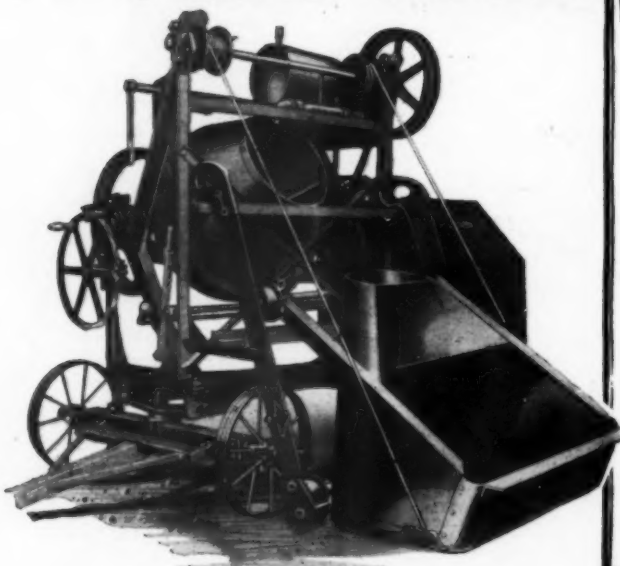
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*Amer. Saw Mill Mch. Co., Hackettstown, N. J.

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A NEW MIXER VALUE



Outstanding WONDER Features

Distinctive shaped mixing drum revolving on a nest of ball bearings.

Mixing drum bearing guaranteed for the life of mixer.

Perfectly balanced mixing drum, tilts easily and quickly.

Thrust screw type loader clutch.

Main drive shaft supported in $4\frac{1}{2}$ " bronze bearing on one end, and 7" babbitted bearing on the other.

Track type loader—easily extended any time.

High grade industrial power plant—magneto equipped.

Alemite lubrication.

Engine house with full opening, ventilated doors.

Low, wide, quick discharging loader skip.

Hot pressed I-beam skids.

DO YOU KNOW another mixer that embodies so many advanced engineering features as the **WONDER** "5-S" at anywhere near its price? It has a capacity of five cubic feet of mixed concrete per batch—a one bag mixer up to and including a 1-2½-4 mix.

Compare the **WONDER** "5-S" with any other mixer of its size on the market!

That's the easiest and best way to select the right mixer. For simplicity—long life—successful performance—speedy operation—the **WONDER** "5-S" has no equal.

The **WONDER** catalog clearly pictures and describes. It will assist you in your selection and will gladly be sent upon request without obligation. Also ask for new low prices!

Construction Machinery Co., Waterloo, Iowa, U.S.A.

Founders of the Single Opening Tilting Mixer Industry

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 *Coldwell Lawn Mower Co., Newburgh, N.Y.
 *Gilsen Mfg. Co., Port Washington, Wis.
 *Ideal Power Lawn Mower Co., Lansing, Mich.
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Both Barber-Greene can be had with the B-G Strike-Off Hopper handling 14 cubic feet on the "25" and 24 cubic feet on the "42."



The new Barber-Greene "25," for short run and lighter work. Capacity: more than 1 cubic yard of loose material per minute.



The Barber-Greene "42," the daddy of all bucket loaders. Capacity: more than 1½ cubic yards of loose material per minute.

Cutting Loading Costs On All Jobs —with the famous B-G Disc-Feed and Floating Boom

THE reasons why Barber-Greene cut loading costs on practically all types of loading jobs are evident when Barber-Greene construction is gone into.

Barber-Greene provide the loading speed that keeps trucks moving—the safety features that protect both the machine and the men around it—the construction that makes the first cost virtually the last one.

And there are two Barber-Greene, priced so that investment costs can be kept in proportion to the jobs handled.

The "42" is designed for heavier, straight-run loading and batching—and the "25" handles sand batching and the loading for which the "42" might be considered too heavy a machine.

Both have the famous Barber-Greene patented Disc-Feed.

The discs work in under the pile, pulling the material in towards the buckets. And that is one big reason why Barber-Greene buckets last and last and last. They do not have to dig.

With the disc-feed there is no positive feeding action to jam when the digging gets tough—even though loader's nose is buried up to the gear guards.

BARBER-GREENE CO., Representatives

BARBER-GREENE BUCKET LOADERS

Only the Barber-Greene



(Patented)

has the famous disc-feed.

When writing to advertisers, please mention the Contractors' & Engineers' Monthly—Thank you.

And there is no danger to workmen who are around the Barber-Greene, or even working on the same pile.

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The only gang necessary with the Barber-Greene is the operator. The Barber-Greene discs are adjustable to eliminate all shovel clean-up.

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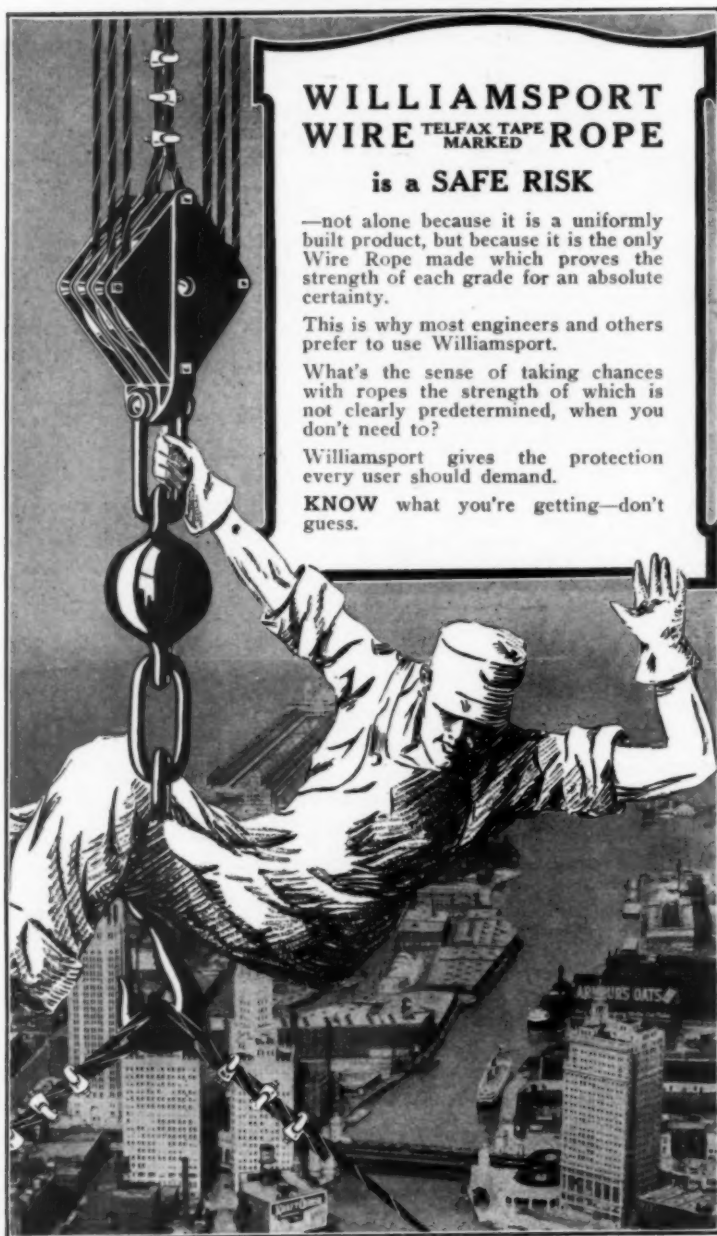
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Evans & Howard Fire Brick Co., St. Louis, Mo.
Laclede Christy Clay Prod. Co., St. Louis, Mo.
Macomb Sewer Pipe Wks., Macomb, Ill.
Pacific Clay Prod. Co., L. Angeles, Cal.
Red Wing Sewer Pipe Co., Red Wing, Minn.
Robinson Clay Prod. Co., Akron, O.
Standard Fire Brick & Sewer Pipe Co., Pueblo, Col.

SEWER CLEANING APPARATUS

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Champion Corp., Hammond, Ind.
Turbine Sewer Mach. Co., Milwaukee.

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Wm. E. Dee Co., Chicago.
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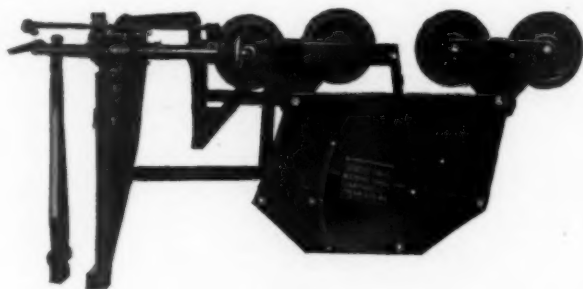
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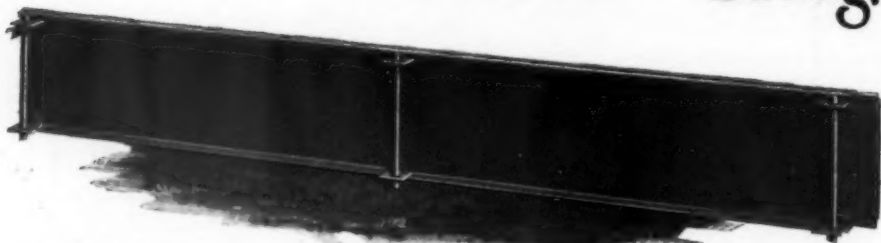
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*Lakewood Eng. Co., Cleveland, O.
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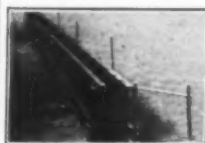
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Street & Sidewalk Forms



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Subsidiary plants for
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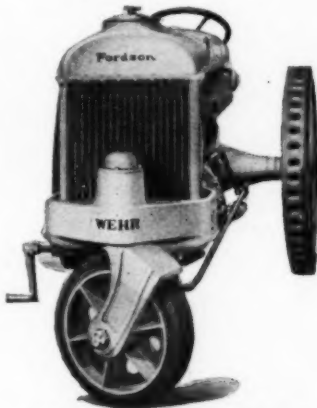
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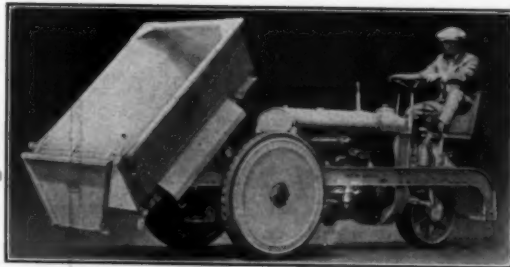


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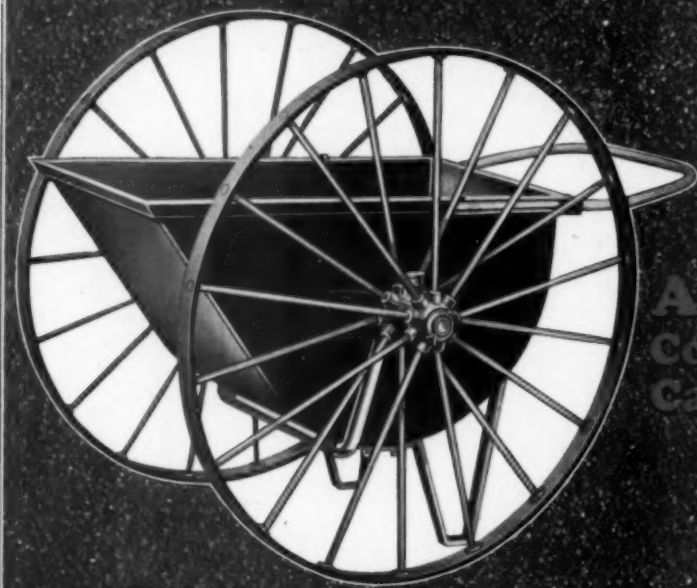
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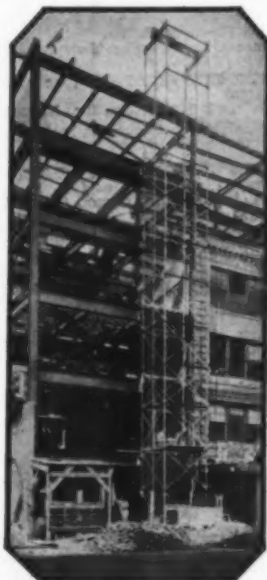
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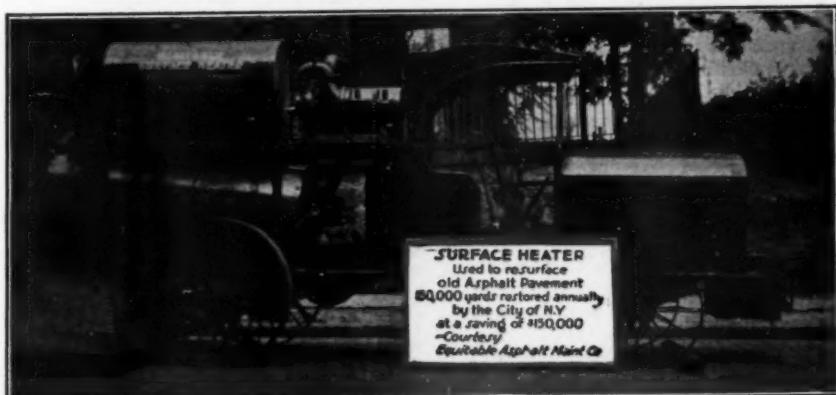
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EQUITABLE SURFACE HEATER

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The new improved model is operated with a gasoline engine, designed for power at low speed. The change in this machine from steam to gasoline practically doubles its capacity, simplifies its operation, saves time and labor, permitting a more economical operation of the machine. It eliminates all dirt, water and steam and makes it possible to resurface without flame, from 1,500 to 2,000 sq. yds. of pavement in an eight-hour day. It is easy to start and operate and anyone that can operate an automobile can easily run this machine.

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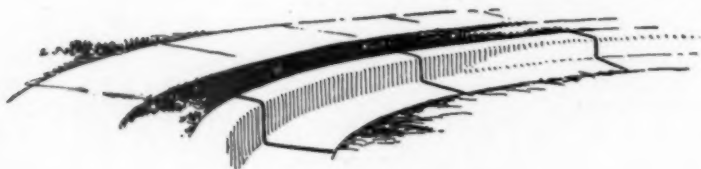
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Originators of the Portable Conveyor
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"We divide gutter and curb



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"At six-foot intervals along the curbing we insert a transverse segment of expansion joint, cutting completely through gutter and curb. In other words, we divide gutter and curb into six-foot slabs.

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"In alley construction we practically eliminated concrete

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The excellent condition of the concrete pavement in the city of Evansville is a tribute to the sound methods employed in its construction. And it is a tribute to Carey Elastite Expansion Joint, too—for this material was used extensively. Engineers all over the country find that the use of Carey Elastite Expansion Joint gives permanence to concrete construction which can be obtained in no other way. The slight cost it adds to the construction is insignificant compared with the savings it effects.

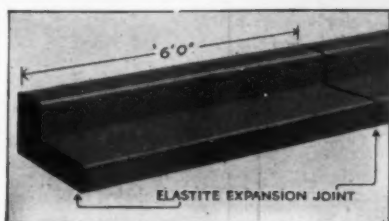
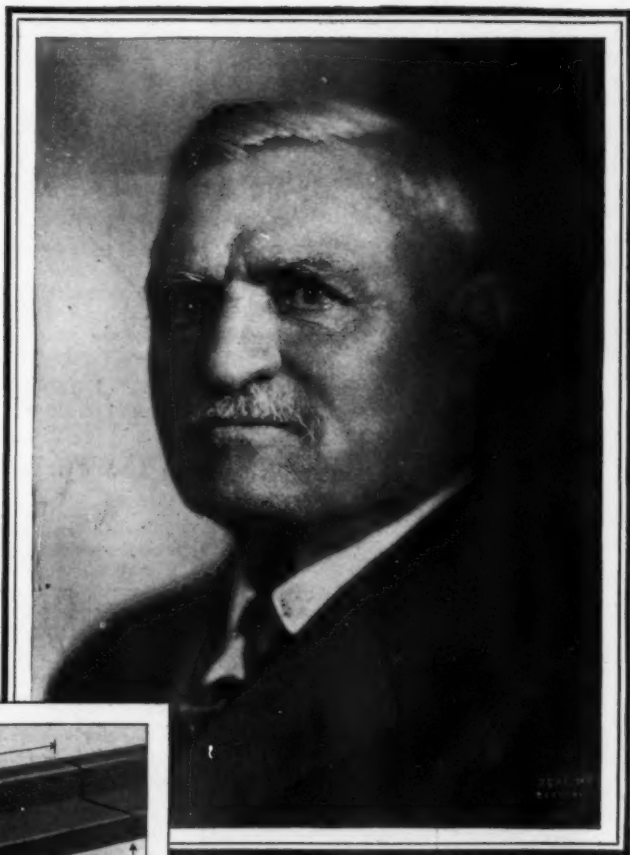
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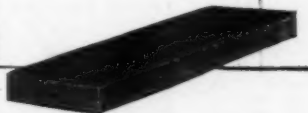
Carey
Elastite
EXPANSION JOINT

into six-foot slabs"

AUGUST PFAFFLIN,
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ville, Indiana. Mr.
Pfafflin began his first
term as City Engineer
in 1890, and has served
a total of seventeen
years in his present
capacity.



The illustration shows how transverse segments of Carey Elastite Expansion Joint are used in Evansville, Ind., to overcome breakage from expansion of gutter and curb.



Carey Elastite Expansion Joint consists of a heavy body of fibrous asphalt interposed between two substantial layers of asphalt-saturated felt. Will not become sticky or run in summer, nor become brittle in winter. As easy to handle as a board. Lengths, widths and thicknesses as desired.

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The Aggre-Meter—

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This is the way to handle sand and stone quickly, easily and accurately. One man does the proportioning and loading as fast as motor trucks can haul the material away.

Furnished all-steel or combination steel - and - wood

The Bucket—

This is the ERIE 1-yd. "Peerless" Bucket, an all-round contractors' and material handlers' bucket. Note the full grab. This bucket has great closing power—long cable life—takes a big load at every grab—and dumps quickly. The contractor is guaranteed that spare parts like the cutting lips will fit.

For extra hard digging or severe service see the Special Digger Bucket.

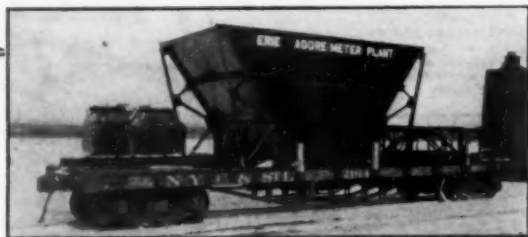
All-steel, with bushed bearings lubricated by forced feed.

**ERIE STEEL
CONSTRUCTION CO.**

Erie, Penna., U. S. A.



To transport this 70-ton Type F Aggre-meter Plant, detach columns and aggre-meters and load the bin on a truck or flat car. To ship the 117-ton plant, first remove the two sloping sides to give railroad clearance.



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Vol. XIII

No. 1

Contractors' and Engineers' Monthly

July,

1926

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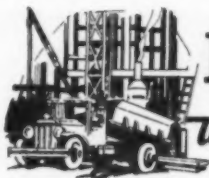
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Placed in forms from one side, requiring no one between forms.

Tie Bolts are used over and over again.

Rod left in wall costs no more than wire cut and placed.

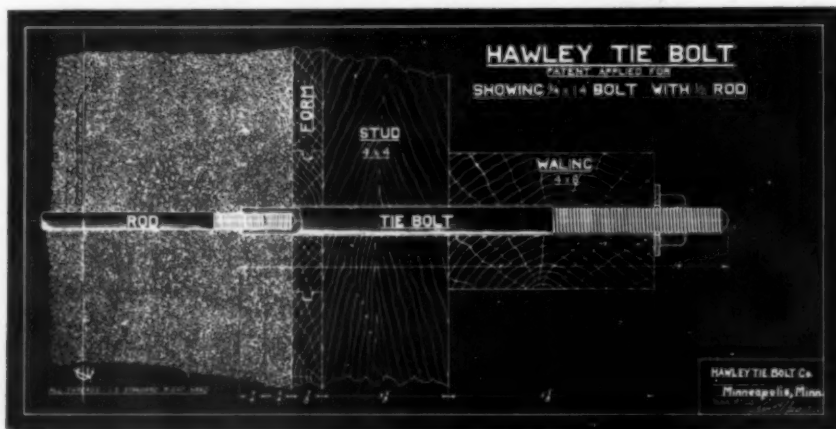
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Distributors in Principal Cities

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Wrecking a Reinforced Concrete Grandstand

By DEAN G. EDWARDS

President, Edwards & Flood, Inc., General Contractors, Brooklyn, N. Y.

IN the heyday of the old Federal League, its promoters built an expensive reinforced concrete grandstand, with structural steel roof, for its Brooklyn baseball field, extending from right field all the way around to left field. When the Federal League was dissolved, the ball park finally came into the possession of the Brooklyn Edison Company after having been leased to the Washington Park Warehouse Corporation for storage purposes.

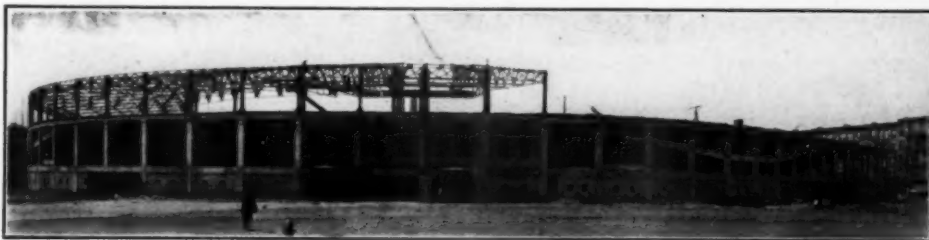
Early in 1926, it was decided to demolish the reinforced concrete grandstand to make way for a service building and garage which will occupy a portion of the lot between First and Third Streets and Third and Fourth Avenues, Brooklyn. The contract was let to Edwards & Flood, Inc., 186 Joralemon Street, Brooklyn, on April 29, for the completion of the job in 60 days.

Actual demolition includes the removal not only of the reinforced concrete grandstand and bleachers with roof, but also of about 1,400 yards of brick masonry, two brick buildings built within the grandstand, and another at the right-field end of the bleachers. The removal of four floodlighting towers and a large struc-

tural steel scoreboard, as well as a steel flag-pole 2 feet in diameter at the base, was included in the contract.

When the work started, although general plans had been made for the methods to be employed in demolishing the structural steel work about the grandstand and bleachers and for the destruction of the reinforced concrete, it was not known exactly what method would prove most successful. The methods tried, which will be discussed individually below, are (1) hand hammers, (2) skull crackers, (3) compressed-air double-acting pile hammers, (4) pneumatic paving breakers, (5) oxyacetylene torches, and (6) dynamite.

The equipment taken onto the job included one 990-pound and one 1,500-pound skull cracker, three Ingersoll-Rand $5\frac{1}{2} \times 6$ portable air-compressors, four complete K.G. oxyacetylene outfits using Linde oxygen and Commercial acetylene, four pneumatic drills, ten pneumatic paving breakers, two Lidgerwood hoists with LeRoi engines, and two Boss hoists, one Fordson tractor equipped with Whitehead and Kales wheels and a White hoist, and the necessary hand tools, with block and tackle, etc.



THE OLD FEDERAL LEAGUE BALL PARK, BROOKLYN, N. Y., JUST AFTER DEMOLITION HAD STARTED

Hand hammers were tried out on a very small scale as a means of determining the method of reinforcing and also for comparative purposes, to figure out costs. The expense was so great that hand hammers were not used except on rainy days in certain sections where they could be used with reasonable economy under cover.

A double-acting pile hammer of the type which has been used successfully for demolishing reinforced concrete buildings, as described in the May, 1926, issue of *CONTRACTORS' &*

was 7 to 11 inches thick, containing about 15 steel reinforcing rods $\frac{3}{8}$ -inch in diameter. The actual demolition by the skull cracker was very rapid, but the frequent shifting of the supporting beam, which was carried on the overhead trusses that supported the roof, slowed up the operation. A 1,500-pound skull cracker proved even more effective, used with the Lidgerwood hoist, dropping the skull cracker from a height varying from 10 to 15 feet. The concrete was shattered, loosening the reinforcing, much of which was salvaged in excellent condition. The



VIEW UNDER THE GRANDSTAND IN EARLY STAGE OF DEMOLITION

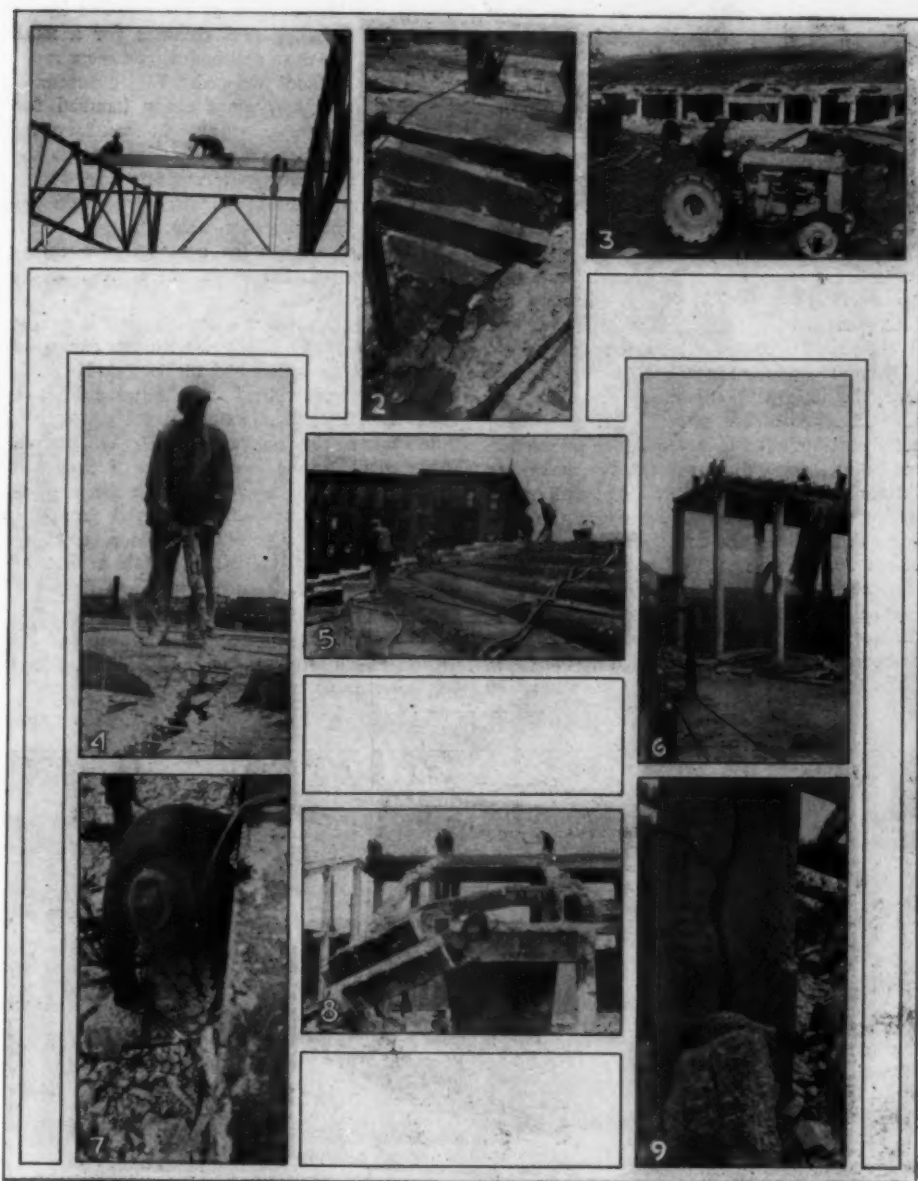
On rainy days various devices were used to destroy the beams and ramps under the cover of the main grandstand

ENGINEER'S MONTHLY, was tried, but not found successful. This was because the hammer was not quite heavy enough for the work, and because the reinforced concrete to be broken up was distributed over a very wide area, necessitating very frequent shifting of the supporting beam for the pile hammer, thus entailing too much lost time to use such expensive plant.

A 990-pound skull cracker, operated by the Fordson and supported as shown in one of the accompanying illustrations, proved to be a very economical method of breaking the slabs, each step of which in the main portion of the bleachers and grandstand measured 20 by 3 feet and

1,500-pound skull cracker proved very effective in breaking away an entire end of a slab, causing it to drop as shown in the illustration, the final reinforcing rods being cut with the oxy-acetylene torch.

Air paving breakers were used most successfully, there being ten Ingersoll-Rand paving breakers on the job. The method of operation was to channel back along the supporting reinforced concrete beams, leaving the reinforcing steel bare. The oxyacetylene operator then went along one side, cutting about two-thirds of the rods, and then to the other side, where all the rods were cut until the section dropped



DEMOLISHING THE FEDERAL LEAGUE CONCRETE GRANDSTAND

1. Resetting block on beam across steel trusses for operation of skull cracker. 2. Section of slab broken out by skull cracker, ready to be dropped by oxyacetylene cutting of reinforcing rods. 3. Fordson with W & K wheels and White heist used for operating 990-pound skull cracker. 4. Channeling-out slabs by paving breaker preparatory to cutting rods and dropping slab. 5. Air-drill gang operating paving breakers on three bays simultaneously. 6. Slab just falling from top section of right field bleachers. 7. Oxyacetylene operator cutting reinforcing rods from precarious position over edge of wall. 8. In foreground, oxyacetylene operator cutting rods to drop heavy section after dynamiting. In background, channeling section. 9. Column shot with dynamite

from its own weight. Most of these large sections, measuring 20 by 12 feet, broke up as they crashed to the ground.

The oxyacetylene cutting torches were used as described above, in cutting the reinforcing rods to drop the various sections demolished by the skull crackers or channeled out by the pneumatic drills or pavement breakers, and were used in removing the overhead trusses which supported the roof. About 15 feet of the columns were left where the overhead trusses were removed, and a derrick boom was rigged on them for use in breaking up the front portion of the grandstand and bleachers which was in front of the roofed section.

Dynamite was used most successfully in shattering the supporting columns, which measured from 12 to 48 inches square. An interesting fact, from both the safety and the production standpoint, was that practically every 15 minutes a dynamite charge was exploded, necessitating the stopping of all work near the shot. While this reduced the actual number of linear feet of channel cut out by the air drills which were working near the dynamiting operations, it is believed that the short rest, a matter of perhaps three minutes, relieved the strain on the operators and actually speeded up the work.

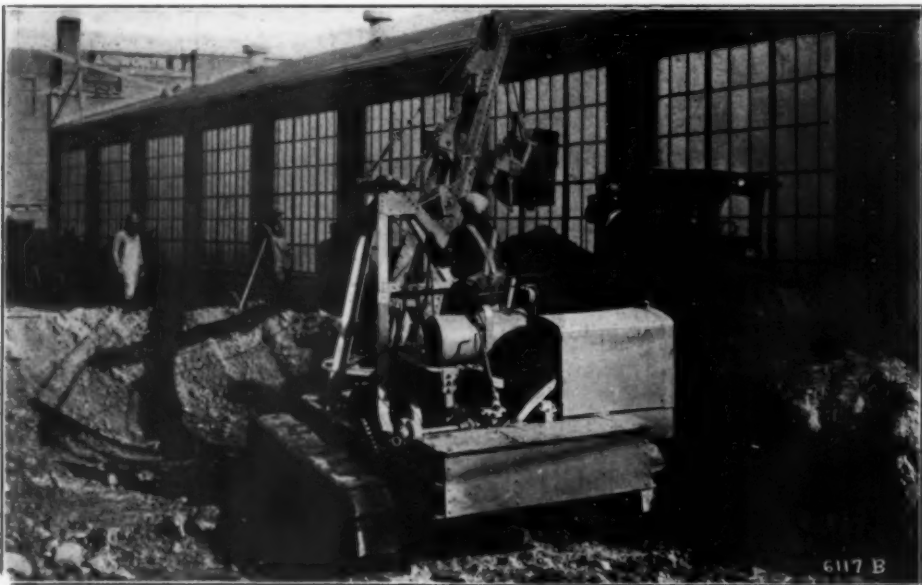
The 60-foot boom carrying a 990-pound drop

weight operated by one of the gasoline hoists and using existing steel columns for a mast has proved the most economical and most rapid of all the methods devised. The concrete is shattered in a way more easily handled for loading by the 990-pound weight than by using the heavier weight. The use of the boom has eliminated the delay in shifting the beams where the steel overhead structure made the use of the boom impracticable.

On June 12, with the contract time three-quarters passed, the work was more than 75 per cent complete.

All the equipment used on this job is owned by Edwards & Flood, Inc., with the exception of the two gas hoists and the two skull crackers, which were rented from Edward Ehrbar, Inc., 29 Meserole Avenue, Brooklyn, N. Y. The value of the job was about \$60,000, including a small income from the sale of junk and from the sale of the brick. The trucking of broken concrete and other material from the plant is handled by William Flood, trucking contractor, Brooklyn, N. Y., with a fleet of Brockway trucks.

The work has been done under the direction of G. L. Knight, mechanical engineer for the Brooklyn Edison Co., Inc., and John F. Flood of Edwards & Flood, Inc.



AN INSLAY EXCAVATOR EQUIPPED WITH SHOVEL SCOOP BEING OPERATED BY S. M. ASBURY, CHARLOTTE, N. C.

We are indebted for this picture to the W. E. Austin Machinery Company, distributors, Atlanta, Ga., who sold this equipment to the contractor

Construction Features of the Boston Hotel Statler

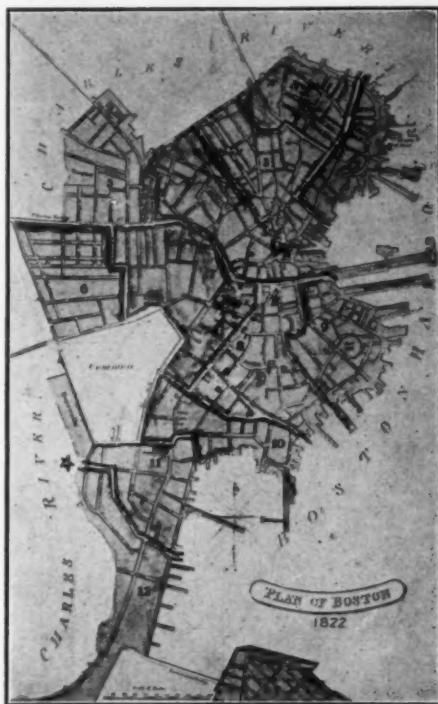
By WALLACE E. BELCHER

Engineer, Dwight P. Robinson & Company, New York

THE old section of Boston was practically an island connected to the Roxbury mainland by a slender causeway, Boston Neck, which separated the Charles River Basin from Boston Harbor, except at flood tides. The shore lines have been extended in all directions as the city grew, and particularly toward the south and southwest, by filling in on both sides of the Neck and by cutting off a large bay of the Charles River in 1850 by the "mill dam," an extension of Beacon Street. The boundary of 1822 on the west was Charles Street, in 1850 Arlington Street, approximately. The filling in of the whole Copley Square district took place during the following years.

The movement of the business development is following the same general line of expansion. Just as in New York the movement is northward away from the old water-front to areas offering greater freedom for new construction, so in Boston the movement is away from the old harbor-front south and west to newer land laid out to better advantage.

The new Hotel Statler is being constructed in the center of "Uptown Boston" covering the entire block bounded by Arlington Street, Columbus Avenue, Providence Street, and St. James Place. Within the last few years this vicinity has been the center of new construction of such buildings as the Park Square Office Building, which is the largest in the city, the John Hancock Insurance Building, the Paine Furniture Building, the Salada Tea Building, the Pettengill Andrews Office Building, and the new University Club. The Elks



MAP OF BOSTON 104 YEARS AGO

Star at left indicates location of new Boston Hotel Statler

Club Building is being completed and a new office building of the Boston Consolidated Gas Company is planned for the corner of Colum-



FOUNDATION
WORK OF BOSTON
HOTEL STATLER
WELL UNDER WAY,
SHOWING CORDUROY
ROAD NECESSARY
FOR TRUCKS



VIEW OF
STATLER SITE
LOOKING NORTH,
SHOWING
BEGINNING OF
STEEL ERECTION

bus Avenue and Arlington Street opposite the hotel. The cutting through of the Stewart Street extension from the South Station to Huntington Avenue in 1922 greatly facilitated highway access to the new district.

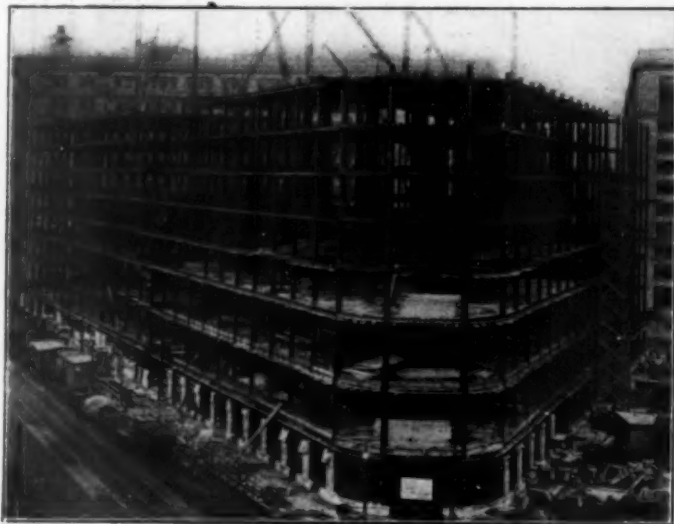
Many leading merchants are moving into "Uptown Boston." The Statler Hotel will be within five minutes' walking distance of the Huntington Avenue and Back Bay stations and within ten minutes of all the new theatres and the shopping center.

Work started on the hotel on August 31, 1925, when Mayor Curley operated the steam shovel taking out the first shovel full of earth. The wrecking of the Selwyn Theatre proved a tough job, not being completed until November 7, delaying general excavation. This theatre was built in 1913, being the first all-steel and concrete theatre in Boston. The founda-

tions were of heavy reinforced concrete, requiring blasting in order to break them up. Underneath these foundations were encountered a great many large granite blocks and wood piles, which formed a part of the foundations for the old Boston and Providence Railroad Depot and train-shed. This depot occupied the Charles Street end of the site, with tracks extending southward. The Arlington Street end of the site was evidently under water when the tracks were built, the remains of the old trestles and supporting piles being in evidence. The piles below ground water were generally sound, and the digging-out and cutting-off of some 2,500 of them was slow work. Several lines of granite capstones or levelers were taken out.

A good bearing soil was found, consisting of firm clay or clay and sand on which a

STAGE OF
CONSTRUCTION
OF BOSTON HOTEL
STATLER ON
APRIL 2, 1926, SHOW-
ING STRUCTURAL
STEEL WORK
WELL UNDER WAY
AND FLOORS
POURED FOR THREE
STORIES





TYPICAL METHOD USED BY DWIGHT P. ROBINSON COMPANY IN CONDUCTING ITS BUILDING OPERATIONS

It will be noted that the major construction operations follow each other in close sequence. At the top of the building the structural steel is being erected. Two floors below the riveting, the floor arches are being poured, and below that, brick work is being laid. Glazing has been placed in the second floor.

safe load of 3 tons per square foot was allowed conservatively. This firm ground was found above the basement level, except along the Arlington Street side, where it was overlaid with blue harbor mud. Open wells, the full size of the footings, were sheeted off and sunk

through this mud to reach the bearing strata.

The heavy work of excavating was handled with three $\frac{3}{4}$ -yard Erie steam shovels with crawler mountings and $\frac{1}{2}$ -yard buckets. Dirt was loaded into a fleet of big trucks, having to make a long haul for disposal. The utility

machine was a crawler crane with clamshell attachment. All dirt excavated between shores was handled by this crane. The lot was excavated to the curb line all around, requiring sheeting using in general 3-inch yellow pine with some steel. All of the steel sheeting was driven by the crane with a No. 5 Vulcan steam hammer hung from the boom. The wood sheeting was all pulled by this same rig. A maximum of 1,500 yards of earth per day was taken out.

The site has an area of about 100,000 square feet and a perimeter of 1,400 feet. Soil condition required continuous pumping. At first one 4-inch Novo and four 3-inch Marlow gaso-

up and brought in water. This, in addition to the natural ground water flow and the surface flow from the heavy rain, required heavy pumping capacity and caused several short delays due to flooding. The deepest excavation was 35 feet below curb, the general line being about 20 feet.

Excavation was completed December 23, most of the concrete piers being in place at that time. The setting of steel grillages started December 28, 1925. Steel was erected rapidly, using six steel derricks, with 100-foot masts and 90-foot booms, operated by Lambert hoists equipped with 50-h.p. G. E. motors and so located as to command the entire area of the



VIEW OF
HOTEL STATLER
LOOKING SOUTHEAST
AND SHOWING
SCAFFOLDING FROM
WHICH ALL TERRA
COTTA, FACE BRICK,
AND TILE WERE
LAID

line-driven double-diaphragm pumps were sufficient, but eventually one 6-inch Worthington electric-driven centrifugal pump and one 3-inch Worthington centrifugal pump were used from the central drain, and the diaphragm pumps located at wet spots, feeding the central sump.

The Edison Electric Illuminating Company of Boston supplied the electric service for construction purposes, both light and power, consisting of 500-kw. capacity direct current.

The northeasterly storms occurring in the late fall were particularly troublesome in conjunction with the flood tide season, causing the backing-up of water in the city sewers. This caused a back pressure, pouring water through the weak points in the system and through broken connections into the site through the banks on all sides. Old, abandoned sewers of wood-box and brick-conduit construction, not now used by the city sewer system, also filled

site and sections of adjacent roadways for picking up the steel. Steel was shipped from the shops marked with a distinguishing color, so that the material required for each derrick was piled and loaded separately at the receiving yard, being delivered directly to the proper derrick. Some 10,000 tons of steel was necessary for the complete building.

One $\frac{3}{4}$ -yard Lakewood mixer and one $\frac{3}{4}$ -yard Ransome mixer, each having 15-horsepower motors, were used on the general masonry work. All exterior brick work, hollow-tile backing, and terra cotta facing have been placed from scaffolding hung from 275 hoisting rigs made by the Patent Scaffolding Company. The total length of the scaffolding, which includes the exterior walls and court walls continuously around the building, is 2,560 feet. The scaffold hoists are spaced about 9 feet apart and floored with planks and

have continuous overhead board protection. The usual outside guard wire netting, 4 feet high, and wood railing are also used to prevent accidents.

The granite base course on the ground floor and a few courses of terra cotta above this were laid from the floor. From that point on all of the mason work was handled from the scaffold, which was hoisted continuously for the full height of the building in two lifts. In this way the walls were carried up as rapidly as the floor arch construction would permit.

All the floor slabs are reinforced cinder concrete, the reinforcement spanning continuously over the structural steel frame with a maximum span of 8 feet. This slab was designed as called for by the Boston code for cinder concrete arches. An interesting feature of the structural steel framework is the fact that the American Bridge Company used its constant depth type of column so that each column has the same outside depth from basement to roof. The variations in strength required are taken care of by changing the thickness of the material and by the use of cover plates keeping within this constant dimension.

The Hotel Statler will be the largest hotel in New England, with 1,300 guest rooms. The fourth floor will be devoted exclusively to sample rooms and display facilities. In the basement will be located the service equipment plants, such as heating, ventilating, refrigerating, vacuum cleaning, pneumatic tube, laundry, storerooms, and also the barber shop and beauty

parlor. On the first floor will be main hotel lobbies and office, kitchen and dining-room, palm room, tea and fountain room, lunch rooms, kitchens, etc. The street fronts, over one-quarter of a mile in length, will be subdivided into store spaces. On the second or mezzanine floor will be located the ballroom and ballroom assembly, lounge, banquet room, pantries, general offices of the management, parlors, library, etc. The third or service floor will be largely devoted to quarters for help, dining-rooms, etc.

The office portion of the building occupies the northerly end of the site, being separated from the hotel portion by a party wall. There will be 400 rented offices in this portion. The two portions have been constructed together as one fourteen-story, height limit building. Fire-proof construction was used throughout, the walls of terra cotta and face brick, with steel sash, the framework being structural steel with concrete floor arches and hollow tile and gypsum partitions. Interiors of public parts will be elaborately decorated, the ornamental treatment being in accordance with the best practice of the Hotels Statler Company.

Dwight P. Robinson & Company, Incorporated, are the general contractors; the excavation contract above outlined being handled by the J. F. White Company; the foundations by the Milton Engineering Company of Boston; the steel work by the American Bridge Company, erected by the George F. Watts Corporation of Boston. The architects are George B. Post & Sons of New York.

Why Machines Wear Out

SUPPOSE you became the proud possessor of a bright, new, shiny automobile of a dependable make, and suppose you were so tickled with it that you drove it every waking moment. And suppose that you were so busy driving it and thinking up new places to go with it that there was no time for changing oil or making adjustments, or doing any of the little things that a well-bred gentleman is supposed to do for his auto. Would you complain if something went wrong and you had to lay up the car for repairs, or would you admit that the suspension of the machine's usefulness was entirely chargeable to your neglect?

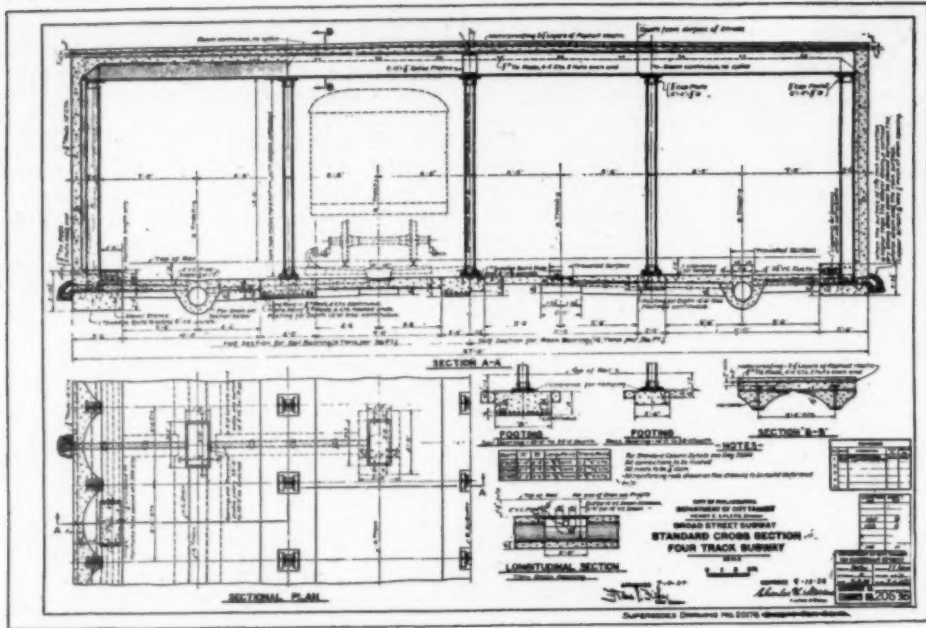
Now suppose you had a ditcher or a locomotive crane—the very last word in its line—in other words, an "American." A machine that performed so well and did so many different jobs competently and economically that it was kept steamed up practically all the time, so that there was no time to make the repairs and adjustments that even the best of machines must have if they are to remain decently efficient. What will your sentiments be when the inevitable and crippling

breakdown occurs out on line and the machine comes limping back—a lame duck scheduled for a long course of sprouts in the shops?

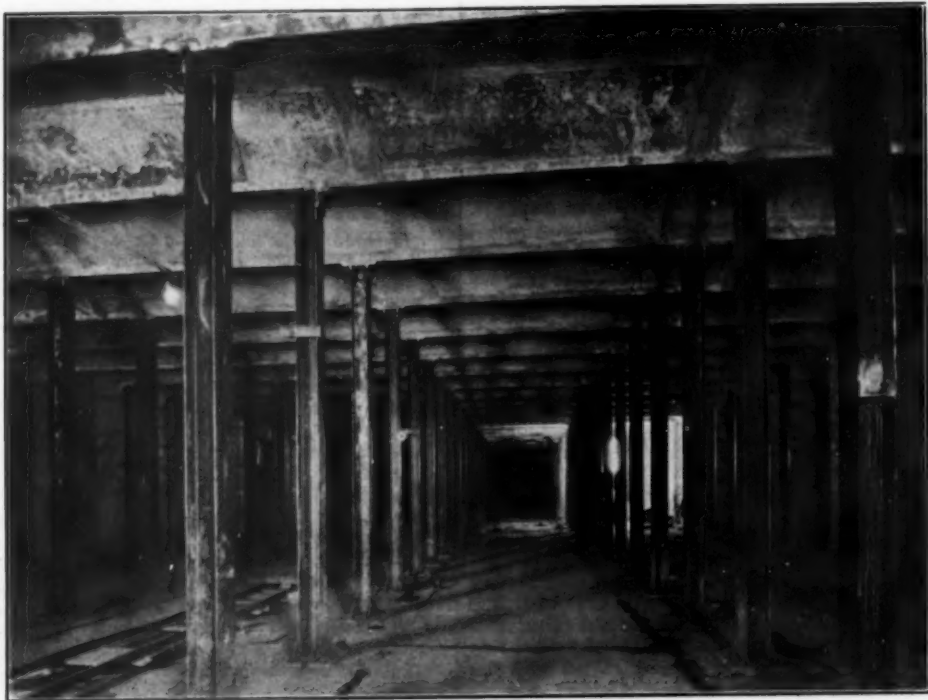
A man may misuse his body for years and still keep out of the hospital, but a machine has no marvelous automatic compensating devices like those which enable the human body to survive stupid abuse and continue to function. If the owner of the machine or those charged with its operation do not personally check up on it every so often and see that it is oiled and adjusted and tuned up, the machine is going to grind itself to pieces prematurely and deprive its owners of years of usefulness.

There is no Humane Society to prevent the misuse of machines. But the owner of the machine pays handsomely for the neglect and abuse inflicted on it. It wears out before he gets a full return on his investment and then it is quite likely that the blame for its abbreviated career of usefulness is laid at the door of the man who designed and built it. Decent care of good machines pays mighty fine dividends.

—American Ditcher Scoopings.



STANDARD CROSS-SECTION OF BROAD STREET FOUR-TRACK SUBWAY, PHILADELPHIA



A FINISHED SECTION OF THE NEW PHILADELPHIA SUBWAY

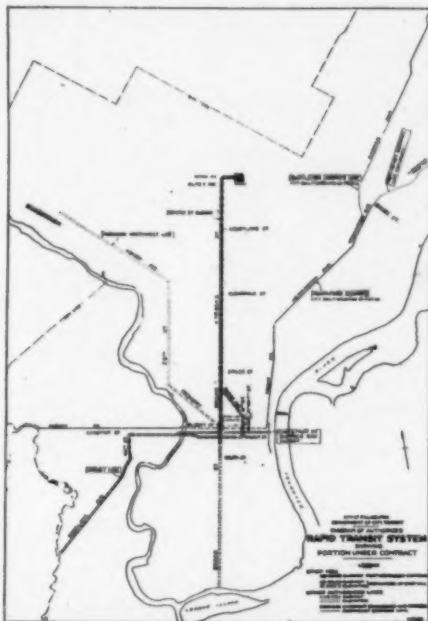
Subway Construction in Philadelphia

Report of Discussions by H. E. Ehlers, Director, Department of City Transit, Philadelphia, Pa., and Paul G. Brown, Managing Engineer, Keystone State Construction Company

IN his discussion of the methods of subway construction used in Philadelphia, before the New York Section, American Society of Civil Engineers, H. E. Ehlers, Director, Department of City Transit, Philadelphia, Pa., called attention first to the fact that it was just two years ago that Mayor W. Freeland Kendrick took office with an authorization by the voters to build high-speed transit lines and \$70,000,000 to start construction. Plans were laid to center efforts on a four-track subway in Broad Street from a point somewhat south of City Hall seven miles to the northern part of the city. Orders were given to prosecute the work as rapidly as possible.

In July, 1924, bids were opened for about 11,000 feet on the first section, and construction was started in August. Late in November, 1924, a second section of 8,600 feet was started, a third section in May, 1925, and the last section in September, 1925.

Broad Street measures 113 feet between building lines, with a 69-foot roadway. Toward the center of the city there is the usual proportion of high buildings, with fewer in the central part of the line and to the north. The subway is built quite near the surface of the ground, with a total width of 57 feet, as shown



AUTHORIZED RAPID-TRANSIT SYSTEM IN PHILADELPHIA



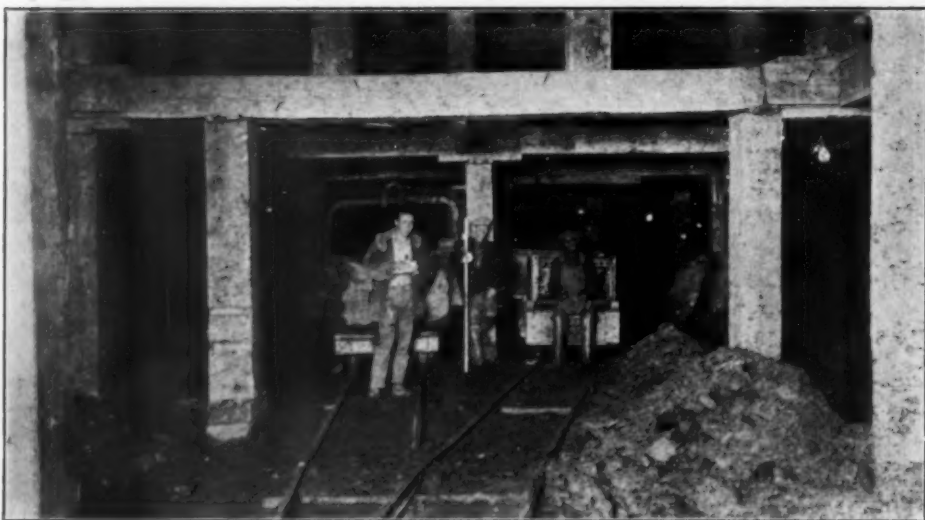
TYPICAL STREET DECKING ON THE KEYSTONE CONTRACT



TIMBERING AN INDUSTRIAL RAILWAY ON KEYSTONE SECTION—EXCAVATION BY HAND

on the standard cross-section below. The standard cross-section is a combination of concrete floor, steel columns and roof beams, with concrete jack-arches for the side walls and roof, differing from general New York City practice chiefly in that the knee bracing between the columns and roof beams is omitted.

What might be called a new departure, drawings for bids were made very complete, showing as far as possible all the work to be done, as well as all details of the work. This is more readily possible, perhaps, in Philadelphia than in New York because of the former city's more systematic and less intensive develop-



TYPICAL TIMBERING AND INDUSTRIAL TRACK LAYOUT AT SHAFT ON KEYSTONE CONTRACT



TIMBERING AND STEEL BOTH IN PLACE ON KEYSTONE CONTRACT

ment. Methods for permanent or temporary relocation of large water-mains and gas-lines as well as sewers, and special construction at railway crossings, were detailed in cooperation with the private corporations or other city departments involved. Steel drawings were made in such detail that subcontractors were able to begin shop drawings and fabrication

almost immediately. The plans and specifications carefully delineated methods for caring for street traffic and limitations in the use of ramps, derricks, and other construction equipment. Relatively few changes were made in these detailed plans during actual construction. The care and attention given to these plans was also reflected in the unit prices bid

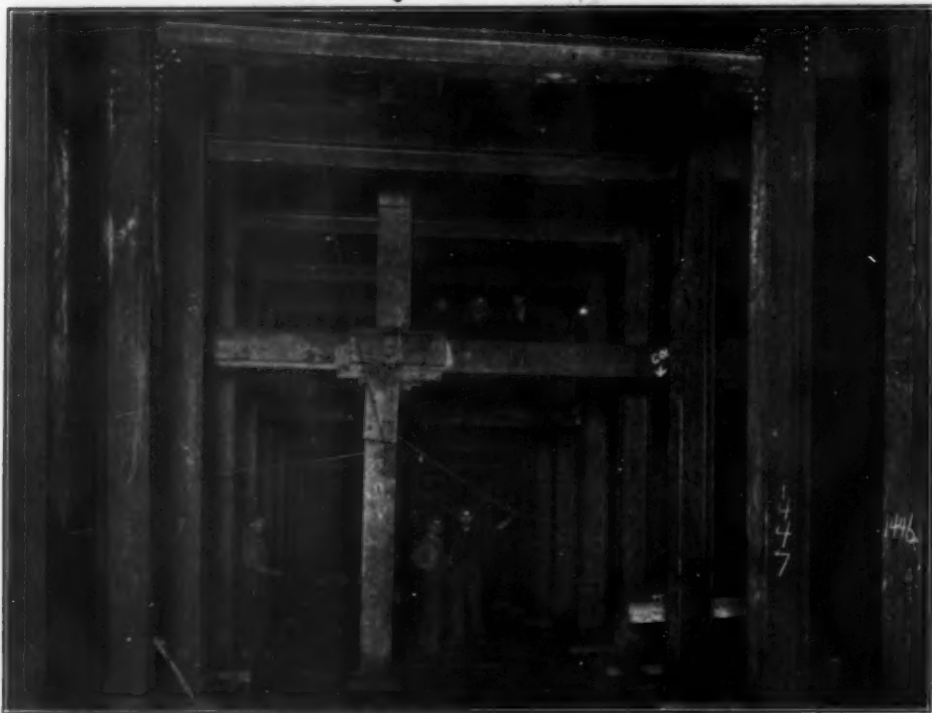


ELECTRIC
LOCOMOTIVE AND
CAR, SHOWING
OPERATIONS BEING
CARRIED ON ON
TWO LEVELS ON
KEYSTONE CONTRACT

and in the speed of construction.

The work was intentionally divided into large sections with a view to inviting bids from the most experienced contractors. The

first section went on two bids to the Keystone State Construction Company, whose bids were both low in the two parts and in total. The second section, 8,600 feet, was awarded to Pat-



STEEL ERECTED AFTER EXCAVATION HAS BEEN CARRIED TO COMPLETION, AND TIMBER BEING REMOVED, ON KEYSTONE CONTRACT



BLAW-KNOX TRAVELER WITH ROOF FORMS AS USED BY KEYSTONE STATE CONSTRUCTION COMPANY

rick McGovern, Inc., at \$14,300,000. The third section, of 7,200 feet, went to the Keystone State Construction Company at \$17,700,000.

Construction Methods

The Keystone State Construction Company has used a method of excavation distinctly different from the one used by Patrick McGovern, Inc. The former has decked the entire width of the cut, using cross-bracing and posting, handling practically all of the excavation work by hand under cover, the material being moved by industrial railway to fifteen shafts approximately 600 feet apart. At the shafts the material is hoisted and dumped into bins, from which heavy-duty motor trucks are loaded and haul it to the disposal point. The shaft structures on one section of this contract are shown in the front cover illustration of this issue of *CONTRACTORS' & ENGINEERS' MONTHLY*. Patrick McGovern, Inc., opened one-half the width of the street, put in decking supported by I-beams which spanned the trench, and braced the sides of the excavation from the beams, thus leaving the trench clear of timber. At intervals of about 900 feet ramps were constructed, and trucks driven from the street into

the excavation were loaded by air shovels and run out again. There are nine ramps on the McGovern contract. After one-half of the section was well along, work was begun on the other side. Some of the accompanying illustrations show in detail the methods of construction employed by Patrick McGovern, Inc.

Paul G. Brown, Managing Engineer, Keystone State Construction Company, in discussing the topic, "New Methods of Subway Construction," was very conservative, stating that he believed in the older methods of proved value. The Keystone contract consists of $3\frac{1}{2}$ miles of four-track subway with seven stations, at a total cost of over \$30,000,000. Along these $3\frac{1}{2}$ miles the gas company has taken care of its own mains, sometimes even ahead of actual construction, greatly facilitating the work. Between Labor Day, 1924, and January, 1926, the Keystone State Construction Company moved out 1,300,000 cubic yards of earth and rock, about half and half. A 20-car siding of the Pennsylvania Railroad within half a mile of the middle of the job facilitated disposal of the spoil. Along the entire length of the siding a platform or ramp was built at the level of the top of the cars so that the



PLACING DECKING ON EAST SIDE OF BROAD STREET

On this portion of the McGovern contract the beams are 24-inch, 104.5-pound Bethlehem girder sections, 50 feet long, and span the first half of the subway excavation. The longitudinal stringers are 6 inches by 12 inches, and the decking is 5-inch by 12-inch Douglas fir. In later sections the first cut was considerably deeper than that shown. The distance from the completed decking to the beginning of the cut was kept at about 200 feet



EXCAVATION METHODS AND CONDITIONS ON THE MCGOVERN CONTRACT

This view shows conditions under which excavation is carried on, the material being loaded by the air-driven shovel shown in the foreground directly onto trucks for removal. The excavation is approximately at grade and is for the four-track structure. Occasional openings are left in the decking to provide ventilation



SUBWAY EXCAVATION ON McGOVERN CONTRACT, SHOWING RAMP LEADING TO THE SURFACE

This view shows excavation for one side of the street which is not yet completely to grade. Excavated material loaded on trucks by means of an air-operated shovel was removed through this ramp, and steel and other construction materials were delivered in the same manner. The ramps are located in the center of the 69-foot roadway and have a grade of 14 per cent



CROSS-BRACING AND SHEETING ON THE McGOVERN CONTRACT

This view shows the cross-bracing and diagonal bracing in deeper sections where the sheeting had to be carried to a lower level. The width of the cut is for one-half of the four-track structure



ERECTING STEEL ON MCGOVERN CONTRACT

Steel in general was lowered through openings in the deck by cranes at the location in which it was to be erected. In some cases it was taken down the ramps and distributed on the concrete subway floor. The absence of posts facilitates distribution and erection

trucks could dump anywhere. This made operations practically independent of the weather.

The spoil from the second contract was used to fill in around the new stadium at the Sesqui-Centennial grounds. A total of 30,000,000 feet of lumber has been used in this contract, and at the peak of the operations 4,500 men were employed. Over 100,000 cubic yards of concrete has been placed, the hauling being done by 34 Ford trucks, each of 0.9-yard capacity.

Mr. Brown lays the rapid progress of the work in the first place to the cooperation of the Mayor and the city departments; second, to the Transit Director, the Chief Engineer, and the Division Engineers; third, to the free labor market existing in Philadelphia; and, fourth, to the continuous flow of materials to the job, as

arranged by J. H. Louchheim, President, Keystone State Construction Company. Mr. Brown feels that there is no material difference between the way the Keystone State Construction Company has handled its Philadelphia contract and the way many earlier subways have been constructed, as a general operation. They first decided on their method of construction, and have stuck to it from the beginning. Liberal use was made of compressed air and compressed-air tools. No old-time subway experts were employed, but the entire organization is made up of young men who have their reputation to make, and they have been doing it exceedingly well. In the conclusion of the talk, most of the details were shown in lantern slides, which we are privileged to reproduce with this article.

An interesting comparison of methods of subway construction in New York and Philadelphia may be secured by reading the New York article on pages 53-57 of the June issue of Contractors' & Engineers' Monthly.

A Heavy-Duty Cable-Laying Plow

Large Contractor in Greater New York Develops Serviceable Tool

A CABLE-LAYING plow which does the work of 75 men in placing heavy cables underground, has been designed and perfected by X. X. Gibboney, Vice-President and Chief Engineer, William F. Kenny Company, one of the larger contracting and engineering organizations in Greater New York.

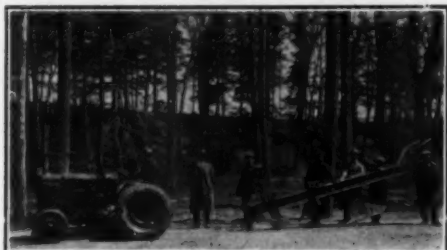
This plow is used in conjunction with a Ford-



CABLE-LAYING PLOW IN SERVICE BEING MOVED BY FORDSON EQUIPPED WITH WHITE HOIST

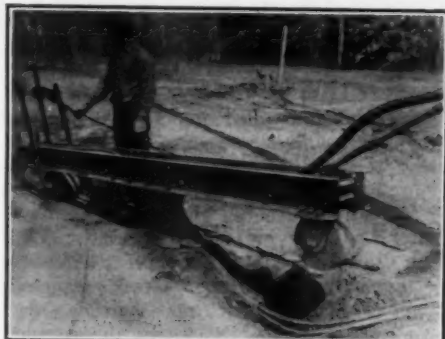
son tractor equipped with dual rubber-tired wheels and a White hoist. In one operation and with the aid of four men, the plow opens the ground, plows the trench, and lays the cable, and after the cable is laid, follows through and covers it, rolling the ground after it. The plow will lay cable to a depth of 36 inches.

The particular plow illustrated laid all of the cable on the Bronx River Parkway, a distance of about 25 miles, and averaged approximately 3,500 feet of cable per day. The plow



CABLE-LAYING PLOW AND FORDSON WHICH LAID TWENTY-FIVE MILES OF CABLE IN BRONX PARKWAY, NEW YORK

is a home-made affair which has not as yet been provided with a name and which is not for sale. We are indebted to H. B. Wallick, Tractor Manager, Haas Motor Car Corporation, Bedford Avenue and Eastern Parkway, Brooklyn, N. Y., for the information on which this item is based.



REAR OF PLOW WITH GROUND REMOVED, SHOWING HOW CABLE WAS LAID

Pneumatic Concrete Mixer Decree Upheld

THE United States Circuit Court of Appeals sitting in New York City upheld on May 13 the decision given by Judge Hand in the United States District Court on August 4, 1925, in favor of the Concrete Mixing and Conveying Company of Chicago in its suit against the Ulen Contracting Corporation and the Shandaken Tunnel Corporation for infringement of what is known as the McMichael patent.

By this decision the right to manufacture concrete mixers adapted to placing concrete pneumatically at a distance from the mixer, as in tunnels, foundation work, piers, etc., is virtually restricted to the holder of the McMichael patent and his sole licensee, the Ransome Concrete Machinery

Company, Dunellen, N. J.

The original decree by Judge Hand gives credit to the inventor, saying in part: "The appreciation by the inventor of the necessity of limiting the concrete to be conveyed to sections of moderate size and weight, and his method, by the second air jet, of securing the cutting-off of a segment from the mass of concrete and a propulsion of this segment through the discharge pipe, involves invention of a high order. His device has displaced all other methods for rapidly and economically conveying, lifting, and placing concrete at long distances from the initial source of supply, and has been used in numerous great enterprises."

Safety Forum Organized by New York Building Congress

Steps Taken to Decrease Alarming Number of Accidents in the Construction Industry

AT a recent meeting the New York Building Congress organized a safety forum of the building industry in order to prevent the large number of unnecessary accidents in the building trades in Greater New York. Alexander Kelso, of the Building Trades Council and Chairman of the Congress Safety Committee, and Frank Rogers, of the Fred T. Ley Company, acted as organization chairmen.

Hon. James A. Hamilton, Industrial Commission, New York State Department of Labor, said that every day in the state of New York there are 1,300 industrial accidents, and that every month 100 fatalities occur. In the year ending June 30, 1925, 374,000,000 industrial accidents happened in the state of New York. He said the biggest contributor to these accidents was the building construction industry. In northern New York State the manufacturing industry has instituted a competition, with the result that there has been a large decrease in preventable accidents.

Mr. Hamilton called attention to the fact that it is necessary to educate the laboring man, who in many instances thinks the state has a large revenue which will compensate the workman, but finds to his sorrow that it is only after a 7-day period, formerly 14 days, that he can draw compensation and he is allowed to receive only two-thirds of his weekly wage rate. In no case can he receive more than \$20 a week. In these days of high wages the economic tension is felt greater than ever before. If these facts are practically instilled in the workman, it will be found in the building industry, as the manufacturing industry has discovered, that there will be a big decrease in accidents caused by carelessness and preventable causes. Only by cooperation through labor and employee can this be overcome.

W. S. Austin, President, W. E. Wood Company, one of the largest construction companies in the Middle West, and President of the Construction Division, National Safety Council, explained how Detroit has tried to overcome her accident fatalities in the construction industry. He said that 70 per cent of the accidents in the construction industry are preventable by common sense and practical means. He said that in order to overcome this the employer must have the cooperation of the

employee, but that the initiative must be taken by the executive. In Detroit, a Safety Committee composed of one representative of each of the construction firms, with a secretary in charge of the work, investigates serious accidents through its Board of Inquiry, made up of one representative from the member firm on whose operation the accident occurred, and the secretary of the Association. Every effort is made to find how the accident occurred, with the one thought in mind of how to prevent a similar accident on the work of other members. In the report no names are mentioned, but facts are given as to how to prevent the reoccurrence of such an accident. Statistical reports are sent out every month according to the method formulated by the Department of Labor, giving the number of man-hours and dollars lost on jobs, and other information based on loss of time compared to the total number of hours working.

Mr. Austin said that he knows of only three firms which keep adequate records of accidents, namely Fred T. Ley & Company, Springfield, Mass., Dwight P. Robinson & Company, New York, and James T. Stewart Company, Pittsburgh, Pa. It is essential that records of accidents be kept by the companies themselves in order to eliminate preventable causes. In Detroit different firms compete for the perfect score of 1,000, which means no accidents.

William E. Crawford, of the Austin Company, said that his company employs 650 men a month, and in the last four months they have had only six accidents. This is due to the fact that they have waked up and found that it is necessary for contractors to educate their workmen. When starting out on their campaign for accident prevention, cards were given out on each job telling in concise form something about accident prevention, and circulars were enclosed in the pay envelopes. The men were then called together on the company's time after luncheon for ten minutes and given a short talk on safety. The proper teaching was then started and a safety committee organized on each job.

If a man is a member of a safety committee and is a carpenter, he has a right to report a lack of safety methods on machinery work, and this is immediately taken up by the company. The safety man has the authority to

stop at any time any work which in his judgment should be stopped until the lack of safety has been corrected. Intelligent information is given out to the men in order to avert accidents. On one job six carpenters lost their eyesight through driving nails with hammers, whereas they should have been instructed to use emery cloth on the hammers. The Austin Company issues a magazine two pages of which are devoted to safety, reporting the number of accidents each month on each superinten-

dent's job, and the number of lost-time accidents and what it cost each job. In this way competition is instituted between the superintendents, the foremen, and the men themselves, resulting in a large decrease in accidents.

John F. Dalton, Chairman, Safety Committee, Building Trades Council of New York, said that the big employers give labor every cooperation in the way of decreasing accidents, but the smaller contractors, in their haste to finish, forget all about accident prevention.

Cement Company Meets New A. S. T. M. Specifications

THE American Society for Testing Materials, on June 25, 1926, at its annual meeting at Atlantic City, unanimously approved, subject to letter ballot, changes in portland cement specifications recommended by its cement committee. The principal changes are a 25-pound increase in tensile strength requirements of standard mortar briquets, from 200 to 225 pounds per square inch for the 7-day period, and from 300 to 325 pounds per square inch for the 28-day period, and the

elimination of the specific gravity tests.

Approval of the revision by letter ballot assured by the unanimous approval of those present at the Society meeting on June 25. The Universal Portland Cement Company, 210 South La Salle Street, Chicago, Ill., through its Vice-President and General Manager, Blaine S. Smith, has announced that all Universal cement sold on and after July 1 will conform to the new requirements.

Steel and Concrete Bridge with Arc-welded Structural Parts

Interesting Piece of Construction Across Belt-Line Ravine, Toronto, Ontario

A STEEL and concrete bridge, known as Governor's Bridge, has been erected across Belt-Line Ravine in the north-eastern part of Toronto. This bridge is 672 feet long with a main arch of 200 feet. As the steel was erected, it was fastened together with a Lincoln arc welder. The concrete was poured as the fabrication went on, but it was not designed to carry the load. This addition to the structure was made simply for the sake of appearances and to sheath the steel against weathering. In the whole job only 2,000 cubic yards of concrete were poured. The Lincoln Electric Company, Cleveland, Ohio, supplied portable welding apparatus particularly adaptable to such a job where construction was carried on under the most unstable conditions.

The steel reinforcing bars used on this job were $2\frac{1}{2}$ inches in diameter. They were first beveled on the end, brought together, and welded until the V-shape formed by the bevels was filled up. Over this was placed a reinforcing collar or muff coupling, which was welded into its permanent position.

By reason of extremely flat arches, thin-walled piers and abutments, but heavy reinforcing rods, the bridge presents an almost frail appearance, an impression that is entirely deceptive. This peculiar construction was largely made possible by the careful placing of the

heavy reinforcing steel. With the added strength and the simple light construction made possible by the welding operation, the load that the bridge may safely stand was substantially increased.

In the west pier is located a $2 \times 5\frac{1}{2}$ -foot door reached by means of steel ladders. This door opens into the interior of the bridge and is so placed that pipes and conduits suspended from the deck beams may be examined. Another outstanding feature of this piece of engineering is that the total cost was less than \$100,000—much lower than the cost of other bridges of same size and capacity.

Governor's Bridge is 88 feet high, connecting Toronto with a very important outlying section, which means that a considerable strain will be expected from vehicular traffic. To meet this demand of vehicular as well as pedestrian traffic, the bridge has a roadway 18 feet wide between curbs and two 4-foot sidewalks. Gulleys and catch-basins are supplied on each side at the ends of the bridge, with outlets into the ravine through tile drains.

The main reinforcement of the arch ribs was butt-welded and the diagonal tension members were lap-welded to the main tension and compression rods. The vertical stirrups were lap-welded together and also welded to certain rods at the top and to the compression rods at



GENERAL
VIEW OF THE
BRIDGE DURING
CONSTRUCTION

the bottom. The vertical rods of the abutments were also welded to certain top rods. The rods in the ties at the abutments and retaining walls were welded to the main vertical steel. All butt welds were built up to be approximately 25 per cent in excess of the original area of the rod, and the welding of the main rods was sufficient to develop the full strength of the rod. The welding of all other intersec-

tions was sufficient to properly secure the rods to their positions.

As a final proof of the success of this super-light construction, it should be mentioned that all timber work which was composed of exceedingly light stock was relieved from strain by the welded construction to such an extent that only 0.4-inch vertical deflection could be observed, and this was at the highest level.

Contracting Typhoid Fever as an Industrial "Accident"

By A. L. H. STREET

WE are asked by a contractor to cite court decisions bearing on the right of an employee to recover an award or damages on account of contracting typhoid fever from water supplied by the employer for drinking purposes on a construction project.

Perhaps the leading case on this subject was decided by the Wisconsin Supreme Court—*Vennen v. New Dells Lumber Co.*, 154 Northwestern Reporter, 640. In that case it appeared that water for boilers was carried in a different set of pipes from those in which water for drinking by the employees was carried. Water from the two sets of pipes became mixed and the employee in this case, in drinking some of it, fatally contracted typhoid fever. In an action under the Wisconsin Workmen's Compensation Act, which provided for compensation where the injury was proximately caused by accident, it was held that the employee had sustained an

accidental injury. It was an accident that the insured drank water containing typhoid bacilli as much as if he had drunk from a glass containing carbolic acid, supposing it was clear water. The agency causing the accident—the bacilli—was external.

The Wisconsin case was followed by the Illinois Supreme Court in the case of *Christ v. Pacific Mutual Life Insurance Company*, 144 Northeastern Reporter, 161, where it appeared that an employee died as a result of fever contracted in drinking water which had become contaminated through a defective valve. It was held that there was death from "accident," within the meaning of an accident insurance policy. That court appears to reflect the predominant judicial view in saying:

"Typhoid fever is a disease. * * * It is due to a specific germ, which is ordinarily taken into the system with food or drink. A death by typhoid fever cannot be regarded

as accidental unless it appears that the disease itself was occasioned by accidental means. The means by which disease is acquired being the entrance of the typhoid bacilli into the system, if the means of such entrance are accidental, the resulting typhoid fever and its fatal effect may also be said to be accidental."

In an English case cited at page 80, 20 American Law Reports, it appeared that a

workman whose duty it was to clean pumps used in connection with sewage discharge contracted typhoid fever. It was proved that he might, while handling the sewage, have come in contact with typhoid germs, but there was no evidence that he had done so. It was held that the evidence did not establish that the accident arose in the course of his employment."

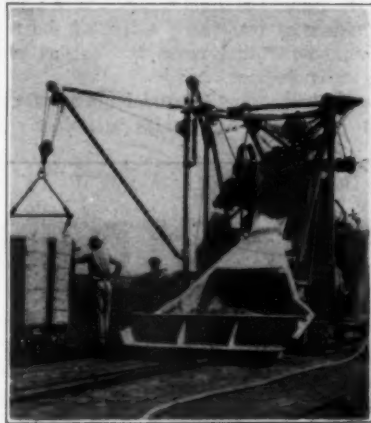
Longitudinal Center Plate Set Ahead of Mixer

Contractor Makes Material Saving Through New Method

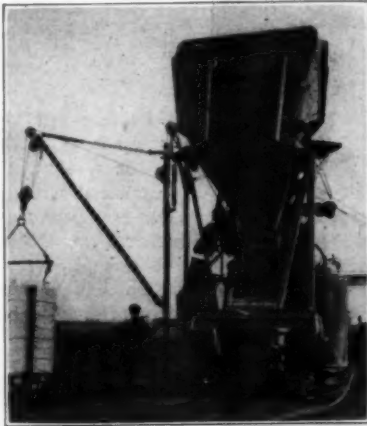
LONGITUDINAL center joints have come into general use to prevent unsightly longitudinal cracks. They are frequently made by setting a thin metal plate on the center line before the concrete is deposited. This plate forms a plane of weakness which divides the slab into two equal strips.

Ordinarily, the plate is staked to the subgrade behind the mixer, a section at a time as the mixer advances. Because it must then be done intermittently, it takes the continuous attention of one man, who must always work hurriedly to avoid interfering with workmen who are placing concrete.

On work in Illinois this last season, the Henkel Construction Company, Mason City, Iowa, set the center plate two or three hundred



THE MIXER SKIP DOWN, SHOWING HOW IT SATISFACTORILY STRADDLES THE STEEL CENTER STRIP



MIXER SKIP IN RAISED POSITION, SHOWING CLEATS BOLTED TO BOTTOM

feet ahead of the mixer. To make this possible, the mixer skip had to be blocked up so that it would not strike the center plate. That was accomplished by bolting two timbers to the bottom of the skip.

Setting the plate ahead of the mixer benefited everybody. The man who did that work was also able to oil the forms, which saved money for the contractor, and there was never any need to hold a batch of concrete while the plate was being put in place. The concrete spreaders were not bothered by a man running around setting plates and pins, and the plate was set to a much straighter line.

It is, of course, possible to set the plate ahead of the mixer only when materials are hauled by industrial railway.

Goggles should not be interchanged among employees unless these protectors have been sterilized before each change, warns the National Safety Council. Workers should get a new pair when the lense becomes cloudy, pitted or cracked.

Grade-Crossing Elimination on the C. M. & St. P.

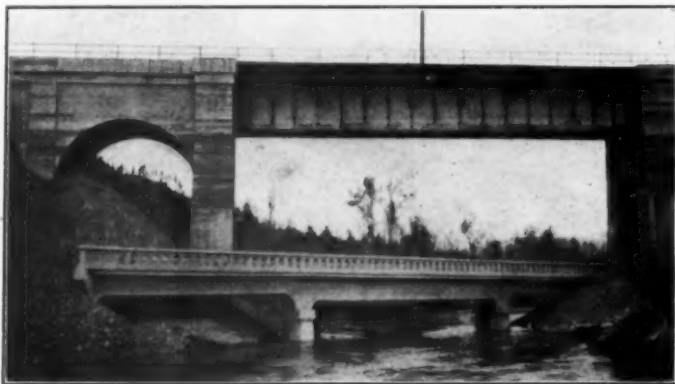
By HOMER L. GIULER

Northwest Equipment Company, Inc., Butte, Mont.

IN Montana the Yellowstone Trail parallels the Northern Pacific main line practically all the way across the state, a distance of some 650 miles, and in the western part of the state the electrified Chicago, Milwaukee and St. Paul Railway also runs parallel with the Yellowstone Trail. As a matter of safety, the State Highway Commission of Montana and the U. S. Bureau of Public Roads have planned to eliminate as many as possible of the trade crossings along this route as well as along other trails in Montana.

The accompanying illustration shows some of the work which has already been done along

The Commissioners of Missoula County during the last year have completed projects eliminating six dangerous grade crossings. The Turah Hill job is located 14 miles west of Missoula. On this job 720 feet of concrete wall was built at an approximate cost of \$27,500. The nature of the rock at this point made it necessary to build the concrete wall, as the rock is seamed with clay and lies at an approximate one-to-one slope. Most of the excavating on this job was done with a $\frac{3}{4}$ -yard Marion shovel, and very little powder was used. The grade line of the road was placed so as to disturb the rock as little as possible. The work



A NICE PIECE
OF CONSTRUCTION
WORK AT A TRIPLE
CROSSING

this line. An interesting piece of construction is the bridge over Nine-Mile Creek 25 miles west of Missoula, which at the same time runs under the C. M. & St. P. electrified railroad, serving the double purpose of bridging the creek and giving grade separation. Some difficulty was encountered on this job in placing the cement piers for the bridge, inasmuch as they are adjacent to the railroad piers, there being danger that the latter would settle. It was therefore necessary to do most of the excavating for the bridge piers under water, and concrete was placed with a tremie.

was done by Fagenstrom Brothers, of Great Falls, Mont., beginning the 6th of August, 1925, and completed December 1, 1925. The winters in Montana being unusually mild, no trouble was experienced nor any delays occasioned by freezing weather. H. "Mixer" Smith was the engineer on this project.

The Highway Commission has completed plans for another project in Missoula County near Turah Hill which will eliminate two more grade crossings. This will also be a steam shovel job, as is most of the road work in western Montana.

Most people, when they hear of somebody being accidentally killed or injured, say "Accidents will happen." These unthinking folk who don't realize that accidents are caused by carelessness, neglect and indifference, are the kind that get hurt. A new pamphlet, "Safe Practices on Construction Work," has just been issued by the National Safety Council.

Efficiency in Concrete Road Construction---Part II

*A Portion of a Report Made by J. L. Harrison, Highway Engineer,
U. S. Bureau of Public Roads*

Material Delivery

The equipment required for material delivery and transportation is the most variable element on a paving job and must be determined for each project. Besides the transportation equipment, each job should have a reasonably well-equipped repair shop with a skilled mechanic in charge to keep the equipment in good running order. Naturally, as such a man may be expected to spend most of his time working on the trucks, he should be particularly well trained to care for these, but he

ment in the contractor's organization and these men are not in a position to develop high production if the superintendence is weak. They can only respond wholeheartedly when good superintendence makes high production possible. In view of the common occurrence of poor superintendence, it is unfair to ask such men to work wholly on a production basis, for the risk they then assume is too great. A far better and fairer way is to pay the standard wage and offer a bonus for production over some specified quantity.

**BAD TRUCK
DISTRIBUTION
WHICH REDUCES
EFFICIENCY**



should know something of other types of equipment as well. On most jobs the mechanic should have a helper who may well know something of blacksmithing.

There are a few key positions in any sort of work where it is outstandingly expensive to hire cheap men. The job mechanic holds one of these positions; the crane man holds another, the mixer operator another. In any of these positions the best man that can be obtained is not too good. As high production always means extra-hard work for these men, a wage scale based, at least in part, on the production obtained is always worthy of consideration. A scale based wholly on production would from the contractor's standpoint be perhaps even more desirable, but the objection to this lies in the fact that the superintendence quite generally is the weakest ele-

Equipment and Labor Required

Efficiency in mixing requires a number of things. The paver should have ample power. It should be able while mixing to move and at the same time drag a heavy fine finisher, and also to start the skip and the discharge as close together as the operator can move the levers. Moreover, the real test of a mixer is not whether it can do these things when new but whether it can do them after it has been in service two or three seasons. This requires a good power-plant. The mixer should be able to move any reasonable distance 10 miles or more, under its own power, without stopping to cool bearings or clutches. This is essential, as a tractor is not always at hand to drag it from one location on the job to another.

Too much care cannot be taken by a con-

tractor who is buying a new mixer in determining what time is required in emptying the skip after it is in a vertical position. A good 5-bag paver will ordinarily clear the skip in less than 5 seconds, yet one recently observed by the writer took over 30 seconds to complete this operation. Poor blade design seemed to be at the bottom of the trouble in this case, and the slow charging and discharging cut production from a possible 48 to about 34 batches an hour. No contractor can afford to own such a mixer. The time required to start the discharge after the time bell rings should be determined and the time required for discharging should be examined. It should be remembered also that there is an appreciable difference between the time required to discharge a batch of sloppy concrete and that required to discharge a batch of the consistency now commonly used in highway work. The latter runs more slowly in the chute, piles up in the generally inadequate bucket, and finally backs up into the chute, with the result that the discharge time is increased. The rate of discharge and the rate at which the skip is raised depend somewhat on the speed at which the engine is running. What the buyer wishes to know is how fast these operations take place under normal conditions, and for that reason he should be sure that the drum speed is normal—about 15 revolutions a minute—and that concrete of standard consistency is being mixed when checking performance in these respects.

Aside from the mechanical operation of the mixer, which is, of course, vital to high production, purchasers of new machines would do well to give thought to the quality and workability of the concrete produced. In this particular there is, perhaps, as much difference as there is in mechanical efficiency. Smooth, well-mixed concrete is easier to work than brash, undermixed concrete. Engineers now give little thought to any phase of this matter except the slump. But a given slump may be had in either of two ways: (1) by thoroughly mixing a proper volume of water with a given amount of cement and aggregate; and (2) by undermixing the same aggregate and cement with excess water. If this latter is the case, the resulting concrete is generally admitted to be of relatively poor quality. That the use of excessive water accompanied by undermixing is a frequent result of current specifications is evidenced by the large number of jobs on which the typical

result of this practice may be observed. The result referred to is the rising of water to the surface of the newly laid concrete in such quantities that it drips over the forms often for an hour or so after the concrete is placed. Where the water content is correct and the mixing is well done, no water will drain over the edge of the forms. If the contractor feels that this is the engineer's business, it may be well to suggest that his self-interest should dictate the selection of a really good mixer for the very good reason that a well-mixed concrete is easier to handle and finish than an undermixed concrete.

The time is coming, and that at no distant date, when the present ineffective treatment of the mixing problem will be replaced by some practical and direct method of insuring thorough mixing and a correct water content. There are, then, a number of reasons that should influence contractors to protect themselves by purchasing only those mixers which, within the specified time, will turn out a really well-mixed batch. There are such mixers and they can be readily distinguished by observing the concrete mixed in them for one minute to a slump of an inch or less, (1) as to the ease with which it can be finished, and (2) whether water rises to the surface and runs off over the forms. If the mixing has been well done, the finishing will be relatively easy, the surface will require no final correction, and no water will run off over the forms.

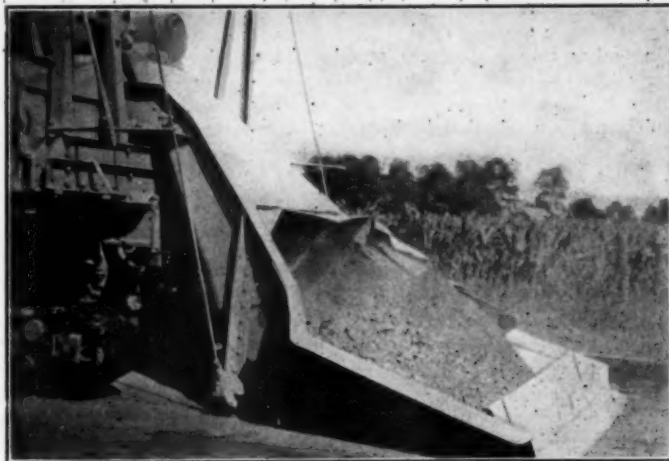
The equipment requirement for mixing is one mixer, and the labor requirement is one operator.

Finishing-Equipment and Personnel

The first operation in connection with finishing is the spreading of the concrete—commonly called puddling. If the mixer operator is really well trained, he will spread the mixed concrete so well that two puddlers will be able to do all the spreading necessary and do the spading along the forms as well. No heavy equipment is needed in connection with this operation.

The next operation is shaping the crown and working and compacting the mass, which is now almost entirely done by machine finishers. A sliding finisher using two sliding screeds does this work outstandingly well. When operated over concrete of proper and uniform consistency, the surface produced is conspicuously uniform. Following immediately behind this machine, one man with a long-handled float can readily wipe out the

A 21-E SKIP
CHARGED WITH A
26.2-CUBIC-FOOT
BATCH, SHOWING
THE EFFECTIVENESS
OF A DUMP-BOARD
IN PREVENTING
SPILLING



screed marks and check the surface with a 10-foot straight-edge. The finish obtained in this way is rapid and so accurate that it is seldom necessary to fill in low spots or to take off a high spot in order to meet the most rigid requirements now in force as to surface finish. The final belting follows the checking of the surface with the straight-edge, and for this operation the finishing-machine operator ordinarily can be called on to aid the finisher, as his time is seldom taken up fully in running the finishing machine. Covering the pavement with burlap or other temporary cover commonly requires two men; the earth covering commonly requires two more; and watering, another.

In addition to the labor requirements above mentioned, common practice and good judgment dictate the employment of a superintendent, a timekeeper, a watchman, and a water boy. In the consideration of labor and equipment required in laying the pavement, however, these are not included, because their duties extend to the whole job and they belong therefore to the job overhead rather than to the labor structure of any unit of the job.

Miscellaneous Labor and Equipment Requirements

A center joint is now quite commonly required. Where it is used, a line of reinforcing steel is often placed along each edge. Sometimes other reinforcing is also used. Placing the center joint and the two lines of reinforcing steel generally requires the time of two men. If the edges are rounded and a center joint is formed over the parting strip, one or two extra men may be required. Work-

ing the center joint, however, is of no apparent value, as the concrete cracks by contraction over the parting strip within a few hours after it is placed and the black center line now widely used to divide traffic fills and obliterates it. When the worked joint is used, the final result is about the same, except that on the whole the center band put down over the crack ordinarily presents the neater appearance.

The common tendency of pavements to develop transverse cracks, together with the fact, increasingly to be observed as pavements grow older, that where no expansion joints are used the buckling which occurs during the summer months tends constantly to increase the roughness of these pavements, leads to the observation that transverse joints are not now used to the extent that they should be. At one time they were in common use, but they fell into disuse because they were expensive to install and because it was difficult to obtain a uniform finish across them. The sliding finisher has eliminated at least the more important part of this difficulty. It is now possible to finish over such a joint without the slightest difficulty and with full assurance that high joints are wholly unnecessary.

Moreover, the use of joints need not at all reduce the rate of pavement production. An extra man, sometimes two extra men, will be required if expansion joints are used, and some extra time is required in finishing, because the joints must be cleaned off carefully on top and along the ends, but as no other difficulties need now attend their use and as pavements where they are used appear to maintain their smoothness better than the

jointless pavements, it is probable that their use will become more general.

One other matter deserves mention here, namely, that in many of the operations incident to laying a concrete pavement the labor requirement is fixed; that is, it cannot be reduced even though the rate of production falls off. Thus, at the material plant, a crane-man, a helper to assist in unloading cars, a hopper operator, and three men handling cement, appear to be an absolute minimum. The equipment cannot consistently be operated with less than this force even if production falls to 100 feet a day. On the other hand, some members of this force are not working to capacity even when the 5-bag paver is running at 48 batches an hour. Much the same is true of most of the other operations. The subgrade crew, for instance, requires a tractor operator, a roller operator, and at least two men, no matter how low production falls, because the equipment cannot be operated with less. The mixer cannot be operated by less than one man, and the finishing can hardly be reduced below a man on the finishing machine and one on the float. There is no need to continue the recital of these minimum requirements to confirm the statement that cutting down the number of batches per hour (as is done whenever the mixing time is extended to $1\frac{1}{4}$, $1\frac{1}{2}$, or 2 minutes) raises the cost of paving because neither the investment in equipment nor the amount of labor employed can be correspondingly re-

duced. Rather, the path toward lower cost lies along the line either of increasing the size of the mixer or of reducing the time of mixing. By either process a closer approach can be made to the full use of men and equipment in the secondary operations.

"The men don't seem to be working a bit harder," remarked a contractor when production on his job had been raised from an average of about 63 feet an hour to an average rate of nearly 100 feet an hour. That was visibly true. The difference was simply in the fact that they were wasting less time. How much further this would have been true remains to be seen. It is, however, apparent that a high-grade mixer running at the rate of about 15 revolutions a minute can turn out first-class concrete in a minute. Experiments are under way to determine whether, if the speed is run up to about 20 revolutions per minute, the mixing time can be reduced proportionately and still produce concrete of equal merit. If so, the mixer cycle might be reduced to about 60 seconds, with the result that 60 batches an hour would represent full efficiency for a 5-bag mixer. The studies which have been made suggest that it probably would be possible for the correlated equipment (except the crane) to meet this rate of production with almost no change in the amount of labor employed. Further study, however, is required before any final conclusions as to this matter can be drawn.

Arbitration Advances

THE movement for the arbitration of purely commercial disputes by trade tribunals has made notable progress during the past two months, according to a bulletin just issued by the American Arbitration Association, 342 Madison Avenue, New York City.

The Louisiana Senate passed unanimously the bill introduced on June 7 "to make valid and enforceable written provisions of agreements for arbitration of disputes arising out of contracts," and the measure is now before the House Judiciary Committee.

Although Louisiana now has arbitration provisions in a civil and commercial code, they are limited in enforceability to existing disputes, and the procedure is considerably restricted. The new bill contains a provision repealing all inconsistent acts. The measure is supported by the New Orleans Association of Commerce, Louisiana Society of Certified Public Accountants, New Orleans Credit Men's Association, Louisiana Bankers' Association, Louisiana Manufacturers' Association, Southern Pine Association, and many

other state and local trade and commercial organizations.

The Kiwanis International Convention at Montreal adopted on June 10 a resolution endorsing the principle of arbitration in the adjustment of commercial controversies and authorized the Committee on Public Affairs, H. Walter Gill, of Atlantic City, N. J., Chairman, to urge the 1,430 Kiwanis Clubs and their 125,000 members to work for the enactment of uniform state arbitration laws.

The Detroit Chamber of Commerce unanimously agreed, at a luncheon on June 9, to establish an arbitration tribunal and named a committee, of which Thomas S. Merrill, President of the Chamber, is Chairman, to make the necessary arrangements.

The Massachusetts Chamber of Commerce has just issued a comprehensive handbook containing comments upon the interpretation and effect of the various sections of the Massachusetts arbitration law, and suggesting rules and regulations for the use of arbitration committees.

A Theory of Labor Economy

By EUGENE B. CLARK

Clark Tractor Company, Buchanan, Mich.

AMERICAN development involves manufacturing as an essential element. Manufacturing requires labor—not only skilled labor, but also much unskilled labor, which goes by the unfortunate term of “common labor.” In this rich and prosperous country the opportunities for rapid improvement of the social condition of the individual are so great that the unskilled laborer may quickly graduate into the class of skilled labor. By this process the ranks of unskilled labor are rapidly depleted of their efficient members, and to those who are left in this class the term “common labor” may rightfully be applied. In the past the class of unskilled labor has constantly gained recruits by immigration. In the future these recruits may be expected to be far less numerous than in the past.

Since industry has need for unskilled labor, it is inevitable that the competition for the small available supply of unskilled labor will force labor rates to higher and higher figures. This influence has already been felt strongly. In the last decade the increase in the rates for unskilled labor has been much more than the increase in the rates for skilled labor. New construction work, such as building and road making, can and has bid up labor rates for its temporary requirements to the disadvantage of others. Thus becomes apparent the problem that immigration restriction presents to the farmer and to the manufacturer.

The Farmer Solves the Problem

The farmer, little as we realize it, already

has solved the problem. In the decade 1909-1919 men engaged in agricultural pursuits in this country decreased over one million, yet during this decade the total output of agricultural products increased greatly. The United States Department of Agriculture says the production per person engaged in agriculture increased fully 16 per cent and possibly 18 per cent during the decade. The increased use of improved implements is the principal cause of this great advance.

The manufacturer's solution of this problem is not difficult to express. He must reduce to the minimum the number of his unskilled employees and must increase to the maximum the productivity of those he retains. He will naturally begin by studying the service in which his unskilled employees are engaged. He will find that in most cases such labor is engaged in moving materials—that is, in transportation.

Contracting Is Manufacturing

E. B. Clark has written a very valuable treatise with the industrial manufacturing field in mind. If you will read this discussion carefully, substituting “contractor” for “manufacturer” and “contracting” for “manufacturing” and in the discussion of internal transportation consider the transportation or handling or conveying of materials on the job, you will find that Mr. Clark has written a most admirable discussion worthy of the consideration of every contractor. This treatise, so well-prepared with one field in mind, may readily be interpreted with the substitutions mentioned above for the edification of the construction industry.

Transportation Is Essential to Production

Let us apparently digress for a moment. Transportation is the conveying of articles

from place to place. We know it is the absolute fundamental of commerce. It is also, though we do not so well realize it, an absolute fundamental of manufacturing. Transportation may be divided broadly into two branches—that which involves the moving of materials between points geographically remote from each other, and that which involves the moving of material between points not far apart. Realizing as we do the importance of the first branch and the part it has played in developing civilization, we are apt to overlook the

second branch and its effect upon our manufacturing costs.

Ships are as old as civilization—in fact, they made civilization possible. Railroads are the basis upon which modern civilization has developed so rapidly and so tremendously, but our familiarity with these means of transportation inclines us to overlook other means of transportation that from the cost standpoint in the aggregate are of ultimate importance. Manufacturers of heavy materials such as iron and steel have developed implements of what we may term internal transportation to a remarkable degree.

Narrow-gauge railroads, powerful cranes, hoists, elevators, unloaders, chargers, and conveyors have so increased the productivity of labor in our steel mills as to make this country the world leader in iron and steel production. However, while we undoubtedly lead the world in the application of improved transportation methods to heavy articles of manufacture, we have not yet given sufficient attention to the possible improvements in the great bulk of manufacturing operations in the industrial and contracting field. Man

as a burden bearer is still a tremendously important element of labor cost. We give him many tools, such as the neck yoke, the basket or box, the wheelbarrow, the wheeled cart, the hand truck, the portable crane, etc., but we still use him, and those we use in this way constitute the manufacturer's class of unskilled labor. It is in the increased efficiency and productivity of this class that the manufacturer must look for the solution to his problem arising from restricted immigration.

The desired result can be obtained only by providing power-driven devices and tools to make internal transportation easier and more rapid. This improves the situation in two ways: it improves the efficiency of the workman by increasing his self-respect—it makes

him a skilled laborer; also it increases the capacity of the individual workman. The reason we have been slow to attack this problem is that it is most difficult. Power-operated devices to accomplish the wide range of speed operation are not easy to develop nor are they apt to be profitable to manufacturers. The decreasing supply of labor to do this necessary transportation work is increasing the demand for such apparatus, however, and will soon offer greater rewards to the genius of the inventor and the resourcefulness of the manufacturer.



THE
LABOR
QUESTION

The qualities that power-driven mobile tools for moving materials in manufacturing establishments must possess are to a considerable extent unique. Consequently, the building of such tools partakes of the nature of pioneering. The fact that employers of unskilled labor for internal transportation fail to realize their need for better equipment, makes the selling of such apparatus also partake of the nature of pioneering. Notwithstanding these difficulties, it is clearly evident that when once the manufacturers of the country are fully awake to the possibilities of savings due to the in-

troduction of power-operated tools for moving materials within plants, the market for this class of apparatus will develop rapidly. In time, manufacturers will become educated to the fact that the unskilled workman, as well as the skilled workman, should be provided with high-class tools.

Productivity of Skilled Labor Is Marvelous

American manufacturers are thoroughly educated to the necessity of providing the skilled workman with high-grade tools. Billions of dollars in this country are invested in lathes, planers, drill presses, milling machines, and many other high-grade tools for the skilled workman. No manager has dif-

faculty in securing appropriations to purchase new tools if the annual savings can be shown to represent a yield of 50 to 100 per cent on the investment. On the other hand, the expenditure of \$1,000 to \$1,500 for a highly developed tool to save unskilled labor is far more difficult to authorize. We have not yet become educated to the necessity of saving unskilled labor, or rather of increasing its productivity.

Unskilled Labor Not Necessarily Unproductive

The average manager would be horrified to know how his overhead expense is increased by his wasteful methods of moving materials by hand. The cost systems in vogue in manufacturing establishments throughout the country are planned to reveal in detail the efficiency of skilled labor, but do not reveal the efficiency of unskilled labor. The latter class is apt to be included under the head of non-productive labor and to be classed as overhead expense. It is treated merely as a necessary evil. This fact is clearly shown when an effort is made to study the savings that are realized by the installation of improved tools for the use of unskilled labor.

When such studies can be made, startling results are shown. In the plant of the largest radiator manufacturer of the country, power-driven hauling devices are shown to be yielding over 600 per cent per annum on the investment. Each such machine releases 8 men for other duties. In the plant of a world-famous manufacturer of tractors, power-driven industrial haulage devices yield a return of 200 per cent per annum on the investment and increase the efficiency of handling materials by 25 per cent. In the yards of a large lumber company, five power-driven haulage machines reduce the cost of handling lumber by 4 cents per 1,000 feet, a sum which yields a large annual return on the investment. Power-operated haulage machines in the plant of a large steel fabricating concern have reduced labor turnover from several hundred per cent to an exceedingly low figure, and have instituted savings amounting to 190 per cent per annum on the investment. In the case of a large manufacturer of bathtubs and similar goods, a power-driven machine makes annual savings of \$28,252, this being over 1,600 per cent on the original investment. In another case a large contractor with a fleet of four machines saved over \$2,800 on a job in 90 days. These figures are authorized by

the users and they can be added to by numberless other cases.

The fact that one manufacturer of power-driven industrial haulage machines has secured 51 per cent of his business over a period of six years in the shape of repeat orders, demonstrates two things: first, how difficult it is to introduce power-driven machines to release unskilled labor; and second, how successful such machines are in service after their introduction. This figure of 51 per cent repeat orders means that on the average each purchaser of such a device has, on the basis of his experience with the first one, bought another one.

The fact that the manufacturers' cost systems are not so planned as to reveal the efficiency or lack of efficiency of unskilled labor, makes it difficult to determine the actual cost of moving materials within the confines of their establishments; that is to say, the cost of internal transportation. The efforts which have been made along this line show that in a number of typical establishments the cost of internal transportation is 80 per cent of the cost of external transportation. If this statement is true for all manufacturing, and I confidently believe that it is within a reasonable variation, it means that the manufacturers of this country pay for moving materials within their plants 80 per cent of what they pay for transportation by freight, express, and parcel post.

This expenditure is very largely for the employment of unskilled labor. Modern manufacturing methods involve splitting manufacturing into numerous operations, which increases the amount of handling and therefore its cost. The motor truck has done much to reduce this cost, but the opportunity for further improvement is tremendous. The decreasing supply of unskilled labor compels attention to this matter, even if a desire to reduce manufacturing costs were not a factor.

The engineer's part in this work is of prime importance. Power-operated devices for use in this field must be designed especially for their work. Such devices must be comparatively simple in construction and in operation. They must be designed and built so as to permit of manufacture at a reasonable cost. Fortunately, American patent laws provide a measure of protection to the successful inventor and designer that warrants him in undertaking pioneer work.

The worst thing about an accident is that nine times out of ten it can be avoided.

Big California Project Won by Tractors

Contractor Gets Job on Strength of Low-Cost Hauling 300,000 Tons of Rock

WHEN the state of California called for bids on the Islais Creek Project No. 2, San Francisco, there was an entry submitted by practically every large engineering contractor in the West. This project called for the reclaiming of 27 acres of San Francisco Bay to be used for industrial sites and at the same time to make possible the construction of 4,200 feet of deep-water piers. One of the contracts for this undertaking specified that 207,000 tons of rock and dirt must be placed by the successful bidder within a period of 137 days.

F. W. Camp, a San Francisco contractor, submitted a bid which was in the neighborhood of \$60,000 less than the next lower. The

ter of a mile, over a dirt road, and the running time approximately ten minutes to the round trip.

Large barges, carrying from 400 to 500 tons each, hauled the rock and dirt out into the bay, where it was dumped. A pier had been constructed to enable the tractors to unload into these barges without coming to a full stop, this being made possible by using side-dump trailers.

The three tractors with their double trailers ran 24 hours a day on a regular schedule, hauling 2,000 tons of rock and dirt in 24 hours, which enabled the steam shovel to work at top speed. From daylight to darkness the tractors hauled to the piers on the Islais Creek Pro-



**P & H SHOVEL
LOADING TRACTOR-
DRAWN TRAILERS
ON BIG CALIFORNIA
DIRT-MOVING
PROJECT**

difference was so great between the low and the highest bids that the State Harbor Commissioners cast out all former bids and called for new ones. Mr. Camp's bids remained the same, and in order to secure the contract he had to disclose the fact that he had based his figures on using Fordson equipment.

Three Fordson tractors working with trailers were the sole means of hauling the huge volume of rock and dirt on this job. Each of the tractors was equipped with two Whitehead & Kales four-wheel side-dump trailers, each trailer carrying 3 yards of rock and dirt, a total weight of 10 tons. The haul is a quar-

ject.

The investment for these tractors and dump body equipment was in the neighborhood of \$11,000 as compared to a cost of approximately \$30,000 for six 5-ton truck chassis and bodies, which would be required to handle the work the tractor did. In order to keep up with the schedule of 10 tons to a load, it would take six 5-ton trucks, requiring three more drivers than were employed.

Each tractor consumed 10 gallons of gasoline in an 8-hour period, and 2 gallons of oil per week. The rock was delivered to the barge at 7 cents a ton, and dirt at 2 cents a ton.

"The less a man's time is worth, the less willing he usually is to take the necessary precautions for safety," says Harold T. Martin of the National Safety Council.

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Steady power!

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An engine that starts promptly!

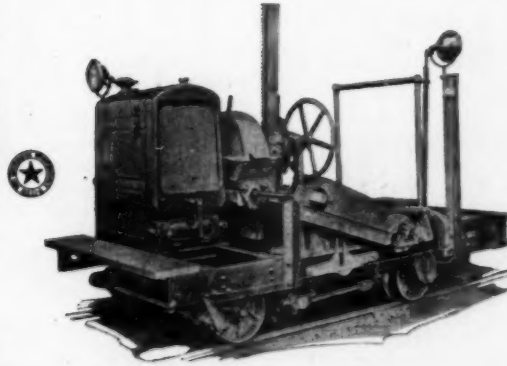
An engine that stops only when the switch is turned off!

An engine that asks no mercy—and consequently gets none!

An engine that is, indeed, power!

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ON THE JOB



Where Hercules sizes were applicable we have always been able to install our engine, economically, expeditiously, and satisfactorily.

Whenever our analysis of a specific power requirement showed that other types of power (electrical, etc.) were more economical, we recommended the other type.

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Legal Points for Contractors

These brief abstracts of court decisions in the contracting fields may aid you in avoiding legal difficulties. Local ordinances or state laws may alter the conditions in your community. If in doubt, consult your own lawyer

Edited by A. L. H. Street Attorney-at-Law

Stopping Check Payments

Although a bank is bound to comply with a depositor's order to stop payment on a check drawn by him, that does not relieve him from liability to the holder of the check on that instrument, payment being wrongfully stopped, according to the decision of the Oklahoma Supreme Court in the case of *Bond vs. Krugg*, 242 Pacific Reporter, 559.

Measure of Care Required in Performing Contract

A contracting builder is bound to perform his work in a proper and workmanlike manner, declared the North Carolina Supreme Court in the case of *Moss vs. Best Knitting Mills*, 130 Southeastern Reporter, 635. "This means," adds the opinion, "that the work shall be done in an ordinarily skillful manner, as a skilled workman should do it. . . . There is an implied agreement such skill as is customary . . . will be used. . . . Manner of best builders not required in the absence of specifications."

Owner's Right to Take Over Work—Work Not Substantially Performed

The fact that a building contract may not expressly authorize the owner to do so will not preclude him from taking over the work and completing it according to the contract and at the contractor's expense. A contractor is not entitled to enforce recovery of the agreed price for a work on the theory of substantial performance, submitting to deductions on account of defects, where it appears that he has not in good faith attempted to comply with the terms of the contract, but, on the contrary, has deliberately made as cheap a job as possible. (*Iowa Supreme Court, Colwitzer vs. Hummel*, 206 Northwestern Reporter, 254.)

Liens for "Labor" and "Material" Furnished for Public Work

One furnishing the use of machinery, tools or equipment to a contractor or subcontractor in the performance of public work, such as the construction of highways, is not entitled to the benefit of a statutory bond for the payment of labor and material claims, holds the Kansas Supreme Court in the case of *Road Supply & Metal Company vs. Bechtelheimer*, 240 Pacific Reporter, 846. The Court holds that "labor" in such cases means physical labor, and that "material" means that which becomes a physical part of completed work. The opinion adds:

"Cases are cited from the Federal court involving contracts under Federal statutes, and from Oregon and Washington involving the statutes of those states, where it is held that the rental or value of the use of machinery and equipment

should be regarded as material entering into the completed work. But these decisions are under statutes which differ materially from our own, and which specifically state that the use of machinery shall be regarded as material, or are fairly open to that interpretation, and for that reason are not controlling."

Building Contractors as Insurance Adjusters

Where a contractor, having large experience in the construction of buildings and full knowledge of the costs of labor and material, is employed to make an examination of a building destroyed by fire and to make estimates of the extent of the loss, and he makes settlement with the adjusters, having full authority to do so from the owner, he is entitled to a reasonable amount as compensation for his services in the absence of special agreement to the contrary. (*Oklahoma Supreme Court in Ferguson vs. A. F. Stewart Construction Company*, 241 Pacific Reporter, 121.)

Material Quality Requirements—Security for Materials Not Incorporated into Work

A highway contractor and his bondsman were held liable for the price of gravel and sand contracted for and shipped for use by the former, in the case of *Standard Sand & Gravel Corporation vs. McClay*, 131 Southeastern Reporter, 754, decided by the North Carolina Supreme Court. The Court observed:

"In sales of personal property where there is no warranty of quality, it is nevertheless the duty of the seller to furnish property reasonably suitable for the uses and purposes for which the property was intended. . . . It also appeared from the testimony of the resident engineer of the state highway commission that the defendant did not wait to get the material tested, but refused it himself, and hence this aspect of the case is immaterial."

The Court then dealt with the question whether or not plaintiff could recover on the contractor's bond, which obligated him to pay for material furnished for the work. Disposing of this phase of the case, the Court said:

"The jury . . . found that the defendant made a valid contract for the material, and that in pursuance thereof material reasonably fit and suitable for the contemplated work was delivered to a common carrier consigned to the defendant. The material was therefore 'furnished' to the contractor, and hence, of necessity, the contractor was liable for the purchase price. Therefore, the contractor being liable, the bond, by its express terms, guaranteed payment."

SAVES BOTH MEN AND MATERIAL

There is neither waste of labor or materials with this Bull Frog No. 42 on the job. It rolls easily. The shaped handles afford an easy, comfortable grip. The tray is always level when the handles are raised—no excessive waste by spilling—yet a full, big load every trip.—And this No. 42 is a durable barrow too. Angle iron wheel-guard loop; seamless tray with rolled rim; the famous Never-break Wheel, angle iron legs, with shoes. It is an outstanding barrow for wet or dry work.

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Administrator's Right to Complete Deceased Contractor's Job

In the case of *Burke's Estate*, 244 Pacific Reporter, 340, the California Supreme Court held that a contractor's administrator was entitled to credit for loss resulting from completion of two contracts left unperformed by the contractor at his death. But the decision does not mean that the administrator could carry on the contracting business on behalf of the estate in general, as by taking new contracts. The following are extracts from the opinion:

"If an administrator or executor, without being authorized to do so, elects or undertakes to carry on the business in which the deceased was engaged, he does so at his peril. . . .

"The general rule is that it is the duty of an administrator to perform the contracts of his intestate unless the acts to be performed are personal, such as an author to compose a particular work, an artist to paint a particular painting. . . .

Contracts to perform such personal acts are discharged by death or by the disability of the person who was to perform said acts. This rule, however, does not apply where the services are of such a character that they may be as well performed by others. . . . Ordinarily, a building contract is not to be brought within that class of contracts which are deemed to have been entered into because of the personal skill or taste of the person who is to perform it. . . . A building contract may, from the character and kind of work to be performed, properly fall within the rule of 'personal performance acts.'"

Contractor's Liability for Injury to Visitors

It is well-settled law that one in possession of premises is under higher responsibility to persons who come there by direct or implied invitation than to mere trespassers. A trespasser takes the place as he finds it, and is not entitled to any greater consideration than avoidance of wanton injury to him. (An exception exists in the case of small children led into tempting dangers.) But one must use a reasonable degree of care to avoid injury to those who come through invitation, express or implied.

In the case of *Logue's Administrator vs. L. E. Meyers' Company* (280 South Western Reporter, 107), the Kentucky Court of Appeals held that a former employee returning to a dam contractor's camp to collect unpaid wages must be regarded as an invitee, within the rule, "that when one invites another to his premises for business purposes, he owes to him the duty to exercise ordinary care and prudence in having a reasonably safe place in which such business may be carried on." The opinion adds:

"But it is said for the company that, at the time and place of the injury, decedent was at a place upon the premises where his business did not require him to be, and where the obligation imposed upon it by law did not apply. Obviously this is true, except for the testimony going to show that the cashier had declined to pay at least a part of his wages until he got another instrument of writing of some kind from his foreman who was on the other side of the river; and according to plaintiff's evidence, decedent was proceeding to the point where that foreman was when he was killed."

One-sided Mistakes Do Not Avoid Binding Effect of Bids

Concerning a lowest bidder's forfeiture of a deposit on refusing to carry out the proposal for the construction of a school building, the Massachusetts Supreme Judicial Court said in the case of *John J. Bowes Company vs. Inhabitants of Town of Milton*, 151 Northeastern Reporter, 116:

"The principal ground upon which the plaintiff contends that it is not bound by the proposal and acceptance is that the amount finally bid of \$184,020 was due to a miscalculation of the sum for which it would construct the building. It is well settled that where a contract has been entered into under a mutual mistake concerning a material fact a court of equity will grant relief. It is equally well settled in this commonwealth that a mistake of but one of the parties to a contract is not ground for relief either in law or equity. . . . There was no mistake on the part of the members of the committee who acted for the town; they acted in good faith without any knowledge that the plaintiff had made any mistake in the submission of its bid. The mistake was wholly its own; it was not induced in any way by the defendant or its agents. The committee accepted the bid as finally made, and had a right to assume that the plaintiff would carry out its agreement. In these circumstances the plaintiff must be held bound by its preliminary contract."

When the Highest Bidder Refuses to Contract

In a Massachusetts case (*John J. Bowes Company vs. Inhabitants of Town of Milton*, 151 Northeastern Reporter, 116) the Supreme Judicial Court of that commonwealth held that a successful bidder for the construction of a school building did not render itself liable in excess of the amount deposited as security for entering into a contract, on repudiating its bid. The Court remarked:

"The terms of the invitation to contractors to bid show that it was intended to treat the deposit as liquidated damages, and it must be so regarded. The plaintiff is liable only to the extent of its deposit. It follows that it is not liable for damages sustained by the town, as alleged in the cross-bill, because the cost of erecting the building was a sum in excess of the plaintiff's bid."

Time for Performing Contracts—Substituting Materials

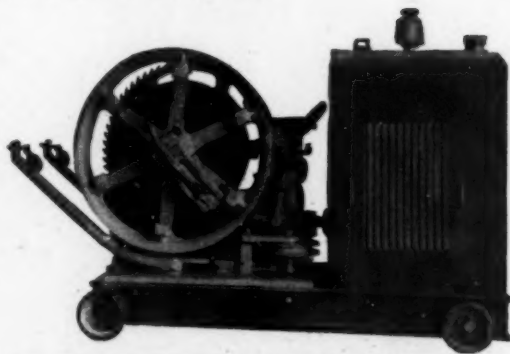
Where one contracts to install tiling in a building in conformity to specifications, and no time for performance is fixed, a reasonable time, determinable by all the circumstances, will be allowed for the performance of the work contracted for, holds the Georgia Court of Appeals in the case of *Candler vs. Hunnicutt*, 132 Southeastern Reporter, 140. The opinion in the case adds:

"Where by the terms of the contract the title to be furnished is of a designated kind produced by a particular manufacturer only, the furnishing of the tile agreed upon, produced by the particular manufacturer only, and not the furnishing of tile just as good procured elsewhere and made by some other manufacturer, is essential to compliance with the terms of the contract."

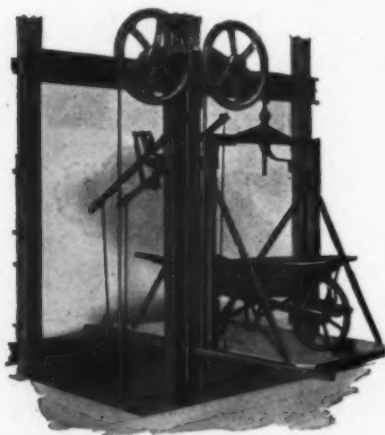
An Automatic Hoist for Builders

New Unit Saves the Wages of an Operator

AN automatic hoist for use in building construction which the manufacturers claim will save the wages of an operator, has been developed by the Zetterlund Hoist & Machine Company, 128 Ferry Street, Milwaukee, Wis. With the Zetterlund automatic hoist the wheelers operate the hoist from the discharge level, using the control lever just as easily and simply as signaling an operator. The hoist stops automatically at the floor level. It is not difficult to erect the hoist and it can be extended to any height and is guaranteed to give service at 125-foot levels. The hoist is propelled by a LeRoi engine which is governed through an automatic gas control, saving fuel. The engine runs slowly until the laborer is ready to lift. Acceleration continues until the discharge level is reached, when it stops automatically. The wooden



SIDE VIEW OF ZETTERLUND AUTOMATIC HOIST WITH CLUTCH FOLDED FOR TRANSPORTATION



TOWER EQUIPMENT IN BUILDING ELEVATOR OR STAIR SHAFT WITH PULLEYS AND CONTROL BARS

guide-posts which are part of the equipment can be used over and over again, as no nails are used in the erection. The parts can be easily and economically replaced and the hoist has no brakes to wear out. Safety dogs prevent danger from loads dropping.

As soon as the handle-bar on the floor level is raised to start the hoist, the quarter-inch control cable becomes slack, permitting the drive-lug on the sheaves to become engaged. As soon as the discharge level is reached, the elevator cage throws the handle-bar into the neutral position. This tightens the clutch cable, which pulls the clutch key out again into the neutral position. Check-pawls running in a ratchet hold the load in position. At the long end of the handle-bars on the side nearest to the operator are fastened the check-pawl cables. Therefore, when the handle-bar is raised, it not only allows the clutch to engage, but shifts the check-pawl out of the descending elevator sheave and engages the check-pawl on the rising elevator sheave. When the discharge level is reached, the check-pawl cable simply becomes slack and no change is made in its position. The check-pawl holds the load so there is no possibility of the load's dropping. Thus, it will be seen, there is only one movement required to start hoisting and the stop is made automatically.

Road Builders Fall into Luck

THAT Baker and Schardschmidt, the contractors who are building the 7-mile stretch of the Roosevelt Highway northward from Florence, Ore., have run into a piece of luck that will be worth many thousands of dollars to them, is the report brought to Eugene, Ore., by Henry C. Bergman, a banker of Florence, Ore., according to the Eugene, Ore., *Guard*. The new road job runs through a section of scrub pine growing in the sand. The contract calls for surfacing the

road with clay and gravel, and the contractors had made plans for hauling the surfacing materials from a pit several miles from Florence. In grading the road through the sand formation, a deposit of 10,000 yards of clay and gravel mixed by nature in the right proportions was found in exactly the right place for hauling, at the same distance from each end. How it happened to be there might puzzle even a geologist, the deposit being surrounded by miles of ocean sand.



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IT is easy to explain the reliability of Tarvia delivery service.

In the first place, The Barrett Company has a greater number of distributing points for road building materials than any other manufacturer.

Secondly, The Barrett Company's unequalled facilities (plants, organization and equipment) insures prompt delivery from these distributing points.

As a result—

Road officials get Tarvia how they want it, where they want it and when they want it.

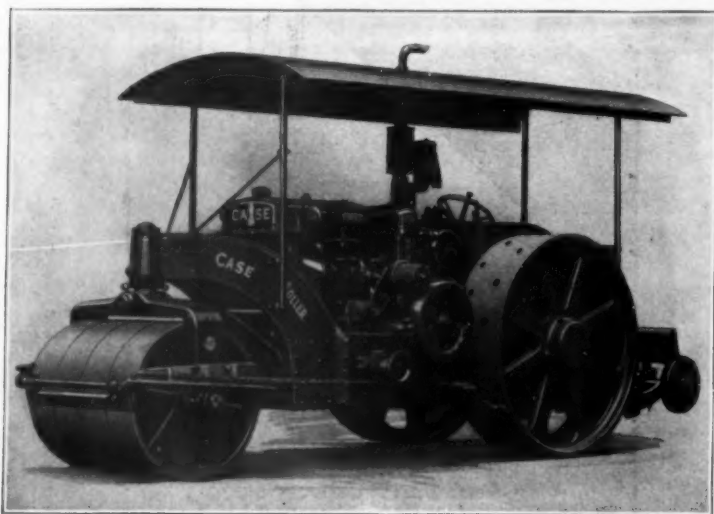
A Sturdily Built 10-Ton Gas Road Roller

Heavy Frame Supports 45-Horsepower, 4-Cylinder Engine

THE new Case 10-ton gas road roller, made by the J. I. Case Threshing Machine Co., Racine, Wis., is designed with a very heavy frame of two $\frac{1}{2}$ -inch boiler plates with a depth of 20 inches. The engine and transmission are carried on steel brackets securely fastened by twin bolts and reamed holes to these pieces of boiler plate.

At the rear end a cross-plate is securely riveted in place, carrying the air cylinder used

The manufacturers claim that the special feature of this new Case gas-roller is that it requires but one operator and he does not have to be a master mechanic. The operator, standing on a roomy platform, has a clear view of the front roller. All operating levers are at his finger-tips. The electric and pressure gages are in the dash in plain sight. The 4-way air valve and the pull lever on the air cylinder are conveniently located behind the operator.



THE
NEW CASE
10-TON GAS
ROAD
ROLLER

with the scarifier. The plate also carries the brackets which hold the scarifier. The rear axle has cannon bearings, each of which is a single casting between the two side members of the frame. The power-plant is the same 45-horsepower motor used in the Case 25-45 tractor. The four vertical cylinders, $5\frac{1}{4} \times 6\frac{3}{4}$ inches, cast in pairs, have renewable cylinder barrels and are finished by grinding.

A large wheel quickly steers the front roller, which is in four sections running loose on the front axle. The scarifier at the rear of the roller will tear up the full width of the roller, as desired, and can be adjusted both as to width and depth. The picks are raised, lowered, and held in position with air-operated cylinder and piston. The air-compressor can be driven while the roller is standing still.

A New High-Capacity Loader

Equipped with a Double Strand of Buckets, New Unit Doubles Capacity

THE new high-capacity truck loader with a loading capacity of four yards per minute, mounted on crawler traction, which has been brought out by the George Haiss Manufacturing Company, 142nd Street and Rider Avenue, New York City, has four strands of chain and two strands of buckets, making a total bucket width of 37 inches. The loader is equipped with a 37-

horsepower Waukesha motor and a transmission box which encloses the clutches and gears similar to that used on Haiss path-digging loaders. The tail-shaft is 9 feet long, which means that the loader clears a path that wide. It can be crowded into the pile with the slow-speed mechanism at 39 inches per minute. The elevator unit is pivoted on an A-frame and is equipped with a raising and

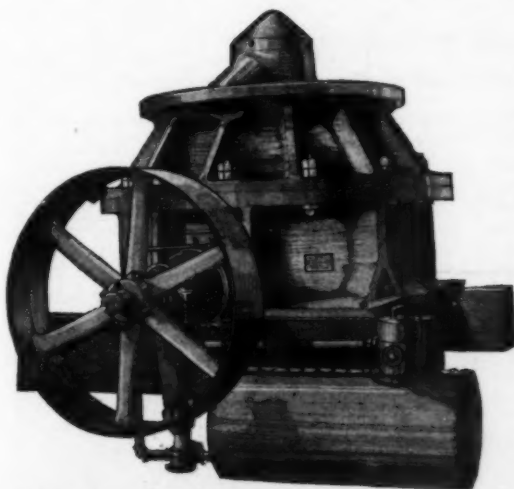
Designed to take a Choke Feed

Here's a Reduction Crusher that not only will take a choke feed but actually works at its best that way. This isn't accident—it's design—**Telsmith Design.**

The openings in Telsmith's big open-feed hopper are so large that they permit an unregulated gravity feed. Automatic feeders are not necessary. Cover it with rock—five, ten, even twenty feet deep—there will be no stalling, no digging out rock with Telsmith on the job.

With its enormous discharge circle—increased by the outward flare of the head and concaves—Telsmith discharges, as it feeds—by gravity—without centrifugal action and with very slight wear upon the spider arms.

Telsmith performance is **INSURED**—pillar shaft, steel frame and steel crown are **guaranteed** against breakage by tramp iron. Bulletin No. 2F21 (Telsmith Reduction Crusher) and Catalog No. 171 (Telsmith Primary Breaker) give all the details. Send for them today.



R. C. No. 1

TELSMITH

SMITH ENGINEERING WORKS

1820 Holton St. Milwaukee, Wis.

Canadian Representative
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lowering device actuated by a hand wheel through a worm and gear jack-knife. This device makes it very easy for one man to raise and lower the elevator as necessary, for, like other Haiss machines, this is a one-man operated machine.

One of these machines has recently been purchased by the Stephens Fuel Company, New York

City, and is loading material at the rate of 4 yards per minute. The chief demand for this machine is among those contractors who use trucks of 5 yards capacity or over, as it materially reduces the time of loading, over the smaller loaders, and the increase in trips made by the trucks pays for the loader.



THE
NEW
HAISS
HIGH-
SPEED
LOADER

A New Four-Cylinder Tandem Roller

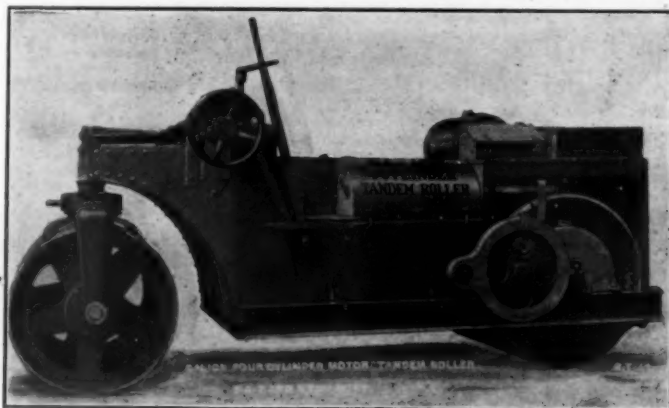
Unit Devised to Handle Same Work as Steam Tandem Rollers

THE new 4-cylinder tandem roller announced by the Galion Iron Works & Manufacturing Company, Galion, Ohio, was designed especially for the work it is to do, and while many of the principles and details which have been proved satisfactory in earlier Galion tandem rollers have been retained, the new roller is really new and not simply an adaptation. Simplicity of operation, ample power, freedom from vibration, and

long service with a minimum of attention or trouble, were objects sought.

The roller is equipped with a Hercules 4-cylinder motor of ample power mounted on a sturdy, rigid chassis frame, reducing vibration. The gearing to the driving roll is a simple spur-gear arrangement. The roller has two speeds each way of 2 and 3½ miles per hour. The special Galion transmission is equipped with Timken bearings

THE
NEW
GALION
4-CYLINDER
ROLLER





"A Wonderful Machine!"

says Contractor Schofield

R. J. and R. W. Schofield of Michigan City, Ind., have just bought a second Bear Cat. They have had their first machine 9 months.

"We consider the Bear Cat a wonderful machine and we are well pleased with its work," writes R. J. Schofield. The features that appeal to him the most, he says, are its speed and ruggedness, ease of operation, and low upkeep and operating cost, \$15.00 for a 9-hour day.

"The repairs have only been \$16.00 for the 9 months," he writes. "On one job with an 18-ft. cut, 3 ft. wide at bottom and 10 ft. wide at top, through gravel, we made 150 ft. per day."


Send today for the 1926 Bear Cat Book, containing complete description and specifications of this dependable, low cost, all purpose machine. Remember, it has full crawler traction and handles all the attachments shown below, interchangeable right on the job.

View of the two Bear Cats owned by R. J. and R. W. Schofield, on a sewer job. One is digging the trench while the other lays pipe and backfills.

THE BYERS MACHINE COMPANY, Ravenna, Ohio
Sales and Service Throughout the Country Builders also of Byers Truckcrane



THE ALL-PURPOSE ONE MAN CRANE
Patents Pending




GRAPPLE



CLAMHELL



BUCKET



BACK FILLER



SHOVEL

BYERS BEAR CAT



Get the 1926 Bear Cat Book. The name of work.
THE BYERS MACHINE CO., Ravenna, Ohio
I am particularly interested in the

Name _____
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throughout. Gears, shafting and bearings are enclosed in a cast iron case, and the entire mechanism is enclosed in a sheet metal housing which has doors making the interior accessible for any necessary adjustments.

Both hand and power steering gear are provided, the latter being directly driven from the crankshaft of the motor to a countershaft from which

the front roll can be turned positively and easily whether the machine is in motion or standing still.

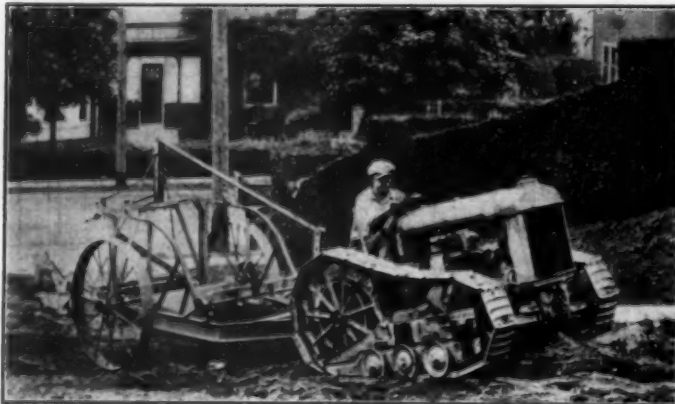
Adjustable scrapers for the rolls, phosphor bronze bearings for the axles, a well-designed cooling system, sprinkling, cooling, and gasoline tanks of ample capacity, and other features, are embodied in this new roller, which is made in 5-, 6-, 7-, and 8-ton sizes.

It Pays to Fit the Equipment to the Job

Reading, Pa., Contractor Effectively Substitutes Crawler-Tractor and Scraper for Two Teams, Two Dump-Wagons, Tractor, and Drag-Scraper

ON a job where he formerly used 13 men in addition to two teams, two dump wagons, a tractor and a drag scraper, D. Milton Bobst, a Reading, Pa., contractor, is now doing the work with two men, a Trackson Full-Crawler-equipped Fordson, and a Miami scraper. He has also found that he can do away with the dump-wagons and teams. Ten men are now being used for clearing away rocks, trees, and stumps, work which could

and drag scraper was labor, as he had to have three men to keep the outfit going, one man to drive the tractor and two men to bear on the scraper so that it would fill to its half-yard capacity. In addition, he constantly had two dump-wagons and ten men working ten hours a day, paying the men 50 cents an hour. The dump-wagon hire and teams at \$10 a day for each team ran up the expenses to a total of \$85 a day.



THE
EQUIPMENT
WHICH EFFECTED
SUCH GREAT
SAVINGS ON THE
BOBST GRADING

not be done before. Thus the work has been speeded up and money saved by the use of proper equipment.

Mr. Bobst says that before buying the Fordson tractor with Trackson tread and the Miami scraper, he used another tractor and drag scraper, for which he paid \$5 rental a day towards gas, oil, repairs, etc. One of the biggest expenses in connection with the tractor

With the new equipment, replacing the former tractor and drag scraper, he uses the ten men for work on filling in and leveling, and has done away with the two dump-wagons and teams. In addition to the driver of the tractor, he now has only one man for filling in and leveling. The daily cost of gasoline for the Fordson is about \$2.30, oil 29 cents, making a total of \$2.59 daily for fuel.

No longer can accident prevention work be regarded as entirely a humanitarian enterprise, although that alone should be sufficient to win the endorsement of industrial captains, comments Lew R. Palmer, Vice-President of the National Safety Council, who says safety work is now an economic necessity in modern business.

Peruvian Engineers Use Waukesha Engined 21-E Pavers

Building La Avenida Progressa

It is Peru's great 79 foot highway connecting Lima, the capital, with Callao, its principal seaport. Under the direction of W. J. Spaulding, Supt., and Alberto Regal, Engr., this great road was built with Koehring 21-E Pavers. These Pavers have been equipped with Waukesha Engines for more than ten years.

All over the world you will find not only Koehring users but thousands of contractors who swear by their Waukesha "Ricardo Head" Engine Equipment, whether it be a Paver—Portable Air Compressor—Power Shovel or Pumping Outfit. Write for "Dynamic Thermostat" book which every gas engine user should have.

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New York	Kansas City	Denver	Tulsa	San Francisco
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Exclusive Builders of Heavy Duty Gasoline Engines for Over Twenty Years

When writing to advertisers, please mention the Contractors' & Engineers' Monthly—Thank you.

NOTES OF INTEREST

Front Cover Illustration Shows Philadelphia Subway Work

WE are indebted to the Service Supply Corporation, 20th and Venango Streets, Philadelphia, Pa., for the interesting illustration appearing on the front cover of this issue of **CONTRACTORS' & ENGINEERS' MONTHLY** showing one of the methods of handling excavation on Broad Street, Philadelphia.

The Service Supply Corporation furnished several heavy-duty Boss 14-S concrete mixers manufactured by the American Cement Machine Company, Keokuk, Iowa, to the Keystone State Construction Company. These were the only portable plants which the Keystone Company had on the job. Several 10-S Boss mixers were also furnished to the Underpinning and Foundation Company, New York City, for the foundation work built to support various buildings along the excavation.

Several hundred Conneaut special shovels manufactured by the Conneaut Shovel Company, Conneaut, Ohio, were furnished by the Service Supply Corporation both to the Keystone State Construction Company and to Patrick McGovern, Inc., for hand mucking. The hand mucking was done one hundred per cent by Keystone and only the cleaning-up by McGovern. All the wheelbarrows and concrete buggies used on this work were furnished by the Service Supply Corporation for Keystone and McGovern, manufactured by the Sidney Steel Scraper Company, Sidney, Ohio, and Ford chain blocks, manufactured by the Ford Chain Block Company of Philadelphia, were used on all portable derricks and Blaw-Knox forms.

C. R. Bassett, of the Service Supply Corporation, believes that that organization furnished 90 per cent of the supplies such as bolts, wire, wrenches, and miscellaneous supplies of this character used by both of the contractors, and they also made all the concrete hoppers and flexible chuting used in pouring the concrete from the deck into position. They also furnished practically all the nails used in the decking.

Additional supplies for both Keystone and McGovern included all the timber tools. Similar equipment was also furnished to Wallace Turnbull, who supplied the lumber for the contractors. All the picks, stone sledges, and spike hammers were supplied by the Service Supply Corporation, as well as a sufficient quantity of handles for extras.

Curtis Lowers Prices of Portable Compressors

THE Curtis Pneumatic Machinery Company, 1931 Kienlen Avenue, St. Louis, Mo., has announced a sharp reduction in the price of the Curtis portable compressor for use in connection with the Fordson tractor. This unit consists of a compressor and tank mounted on either steel- or rubber-tired wheels. The unit attaches to the Fordson tractor, using Fordson power both for

operation and for moving the unit to and from the work.

Quantity Surveyors Organize National Institute

THE American Institute of Quantity Surveyors, a national organization of professional quantity surveyors engaged in this important activity, was formed the first week of June in Chicago, with the following officers: President, W. F. Jackson, W. F. Jackson Company, Inc., Age-Herald Building, Birmingham, Ala.; Vice-President, C. L. Weeks, Lissner Building, Los Angeles, Calif.; Second Vice-President, Oscar Euphrat, Euphrat & Hanly, 323 Hammond Street, Cincinnati, Ohio; Secretary, C. T. Burman, Burman Quantity Bureau, 510 North Dearborn Street, Chicago, Ill.; Treasurer, G. Szmak, Universal Engineering Company, 813 Liberty Building, 945 Main Street, Bridgeport, Conn.

Osgood Purchases Fairbanks

THE Osgood Company, Marion, Ohio, has announced that it has purchased from the receiver of the Fairbanks Steam Shovel Company, Marion, Ohio, the good-will and all the assets of the Fairbanks Steam Shovel Company, including patterns, records, drawings, formers, etc., together with the entire stock of material that was on hand for the manufacture of steam and gas shovels and dredges. The purchasers are prepared to furnish from the records and drawings now in their possession repair parts for Fairbanks machinery and equipment that is now in the field.

Charles Melvin, who was connected with the Fairbanks Steam Shovel Company for 24 years, has been retained by the Osgood Company and placed in charge of the department for handling service and repair parts on Fairbanks machines. It is understood that there are possibly four hundred Fairbanks dredges in the field. All owners of dredges or other Fairbanks equipment are requested to write to the Osgood Company, giving the present location of their machinery, its size and number, in order that prints, drawings, and other records may be properly placed in shape for the expeditious handling of repair orders when received. Correspondence relative to the equipment of Fairbanks manufacture should be addressed to the Osgood Company, Marion, Ohio.

Dot Lubricators in the Industrial Field

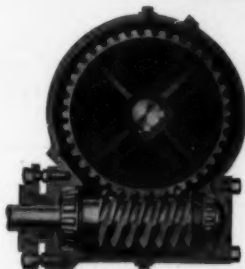
THE Carr Fastener Company, Cambridge, Mass., manufacturer of "Dot" lubricators, has disposed of its interest in the automobile and commercial car field in order that it may devote its efforts to the development of the industrial field entirely. This company states that it is probable that the Dot lubricator will be surrounded with other industrial lubricator equipment, so that the company may offer the industrial trade a more complete lubricator service than ever before.

KOEHRING 7-S DANDIE Mixer



7-S Dandie Mixer

Two or four cylinder gasoline engine! Power charging skip, or low charging platform, automatic water measuring tank, and light duty hoist. Rubber tires and disc wheels, or steel rimmed wheels. Complies with A. G. C. standards.



Worm gear reduction unit mounted on roller bearings enclosed in dust tight housing, and running in oil bath!

To know the Dandie is to be informed on outstanding values in light mixer performance and construction. It's money to you to know the Dandie before you buy a mixer.

Send back the coupon.

FIND, if you can, another mixer that combines all the outstanding features and values of the Dandie and still sells within the price range for light mixers!

Find another with 4 cylinder radiator cooled engine, with choice of two cylinder hopper cooled engine — another with the same high grade construction including worm gear drive shaft mounted on roller bearings and reduction gears running in oil bath! Bronze bushed drum roller bearings, the rollers pinned to shafts and the shafts turning in the big bearings! Double gear drum drive! Fast clean charging, and fast discharging!

The Koehring Dandie is not only a mixer of long trouble-free service, but a fast worker. Big volume standardized production alone makes possible this remarkable mixer within the range of light mixer prices. Send back the coupon today for full detailed facts about this money-making mixer, this great value for a light mixer price!

KOEHRING COMPANY

PAVERS, MIXERS—GASOLINE SHOVELS, CRANES AND DRAGLINES
MILWAUKEE, WISCONSIN

Sales Offices and Service Warehouses in all principal cities
Foreign Department, Room 1370, 50 Church Street, New York City
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105 Front Street, East, Toronto, Ontario
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Send Back Coupon for Full Details!

Take our word for it, you will be putting yourself in the way of extra profits and extra value if you learn all about the details of this Dandie Model before you decide on a one bag light mixer. No obligations. Send back the coupon today!

KOEHRING COMPANY, Dept. D-8 MILWAUKEE, WIS.

Without obligation to me of any kind, send me free information about the Koehring Dandie Light Mixer.

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A Spiral Rivetless Pipe

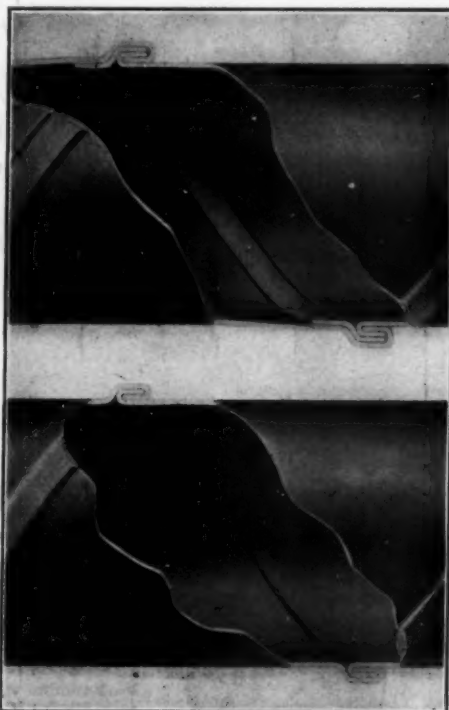
Steel Pipe Formed from Continuous Strip of Metal Without Rivets

A MACHINE has been designed and patented by Carl G. Naylor, President, Naylor Spiral Pipe Company, 1230 East 92nd Street, Chicago, Ill., by which a strip of sheet steel is wound into spiral shape, but instead of riveting, the edges are automatically flanged and formed into a four-ply lock seam laid up on the outside of the pipe. It is formed in a continuous piece and then cut into desired sections up to 40 feet in length. The pipe is made from No. 16 to No. 10 gage sheets and from 4 inches to 30 inches in diameter. Plain, galvanized, painted, and asphalted spiral lock-seam pipe has been made to date.

This pipe is said to be stronger than pipe made of sheets rolled into shape with a joint made in any other manner, because the lock seam on the outside of the pipe acts as additional reinforcing. The inside of the pipe is smooth with a total absence of rivets, thus reducing friction and minimizing the required pressure for the flow of liquids.

Because of its unusual strength and watertightness, plus its low cost, this pipe is now being used for built-up pile construction work. A length of pipe is secured to the end of a wooden pipe and the entire unit then driven into the ground, after which the plunger is withdrawn and the spiral pipe on the top of the length filled with concrete.

No matter what your personal interest may be in the construction field, you will find something helpful in Contractors' & Engineers' Monthly.



TWO TYPES OF SPIRAL RIVETLESS PIPE

At top, pipe made with a high-carbon steel wearing strip for handling abrasive material. At bottom, pipe used for handling water, air, gas and other non-abrasive fluids

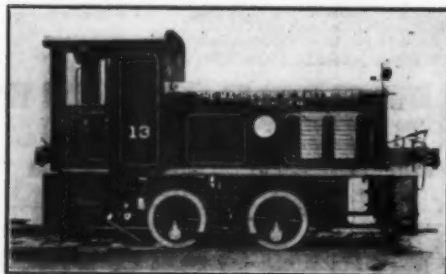
Improvements in 8-Ton and Larger Gasoline Locomotives

Elliptic Springs and Cross-Equalizers Giving Three-Point Suspension Now Made Standard by Manufacturer

GASOLINE locomotives in all sizes from 8 tons up, manufactured by the Vulcan Iron Works, Wilkes-Barre, Pa., are to be furnished with elliptic springs and cross-equalizers,

giving a three-point suspension of the chassis. With this design derailment is a rare occurrence, inasmuch as the weight of the locomotive is always equalized on all the bearings, regardless of any unevenness or irregularities in the track. Three-point suspension is standard practice on all steam locomotives. Vulcan electric locomotives are of this design, and the heavy Vulcan gasoline locomotives from 16 tons up have always been so constructed.

Among those who have already purchased Vulcan locomotives with three-point suspension are the Mathieson Alkali Works, Canada Cement Company, Albany Crushed Stone Corporation, Bethlehem Steel Company, National Tube Company, International Motor Company, Erie Tube Company, Utah Iron Ore Corporation, St. Lawrence Paper Mills, E. B. Eddy Company, Stone & Webster, Inc., The Arundel Corporation, and

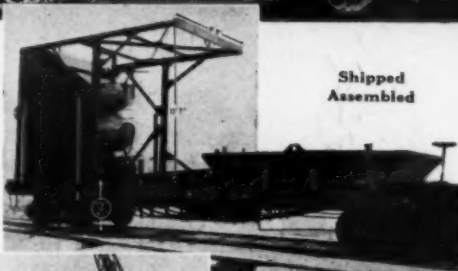


ONE OF THE NEW VULCAN LOCOMOTIVES WITH ELLIPTIC SPRINGS AND CROSS-EQUALIZERS

HOOK'er To A TRUCK



Erected in Less Than
10 Minutes



Shipped
Assembled

And Haul'er To The Next Job

It doesn't matter whether the next job of batching is 15 miles away or 1,500 miles away—HELTZEL Trailer Batcher Bins will stand the ride and the gaff—year after year saving you money on every job.



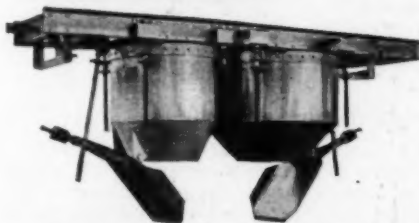
A Crane lifts
it into Batch-
ing Position



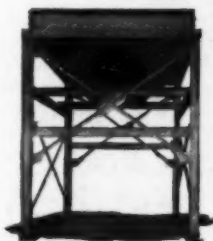
The HELTZEL Trailer Batcher Bin comes to you in a flat car all assembled, trailer wheels ready for use and batchers in position. All you do is skid it off the car, back up a truck and hook on. Haul'er to the next job at speed of 20 miles per hour, pick it up with a crane and you're ready for the first batch. And a single lever performs the complete operation of filling, cutting off, dumping the batch of sand and stone, closing the lower and opening the upper gates in less than 10 seconds (all by one operator).

Is it any wonder that one contractor sold a \$1,400.00 outfit for \$75.00 to buy this equipment? Is it any wonder that thousands of dollars in old style bins and batchers are being scrapped every week and replaced with HELTZEL Equipment?

Write for 1926 Bin and Batchers Catalog today. It contains the latest data on the most efficient Bin and Batchers Equipment manufactured today.



Single Lever Control
Six Batches a Minute
by a single operator



HELTZEL Sectional
Bins. Only 32 pins.
Erected in 4 hours.

The Heltzel Steel Form & Iron Co.
WARREN, OHIO

HELTZEL

Trailer - Batchers Bins

Also Manufacturers of Steel Forms for Road,
Curb and Gutter and Sidewalk Paving.

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A Sand and Gravel Washer That Produces Clean Aggregate

Single-troughed Unit Has a Capacity of from 250 to 300 Tons per Day

CLEAN aggregate is an absolute essential for strong concrete. Every contractor should be sure that his sand and gravel are free of organic matter. In producing his own aggregates he should use proper means to wash them to insure cleanliness. The Eagle sand and gravel washer, made by the Eagle Iron Works, Des Moines, Iowa, is a machine consisting of a 24-inch steel tub 12 feet long with water inlets in the bottom and at the lower end. It is set at an angle so that the water flows toward the lower end.

Gravel is fed into the washer at the lower end and conveyed through the water by means of a screw with replaceable chilled iron flights, so that any section may be replaced without taking out the entire screw. The action is such that all sticks, coal, shale, leaves, and other organic matter which is lighter than the sand or gravel are immediately placed in suspension and are carried off with the water into the discharge flume. All earth, mud balls, etc., are ground up with the gravel by means of the screw and are dissolved or placed in suspension and carried off with the water. The clean gravel is conveyed by means of the screw up the inclined tub and out through a hole in the bottom at the upper end. A special design of thrust bearing is used at the lower end of the shaft, which is so protected that it is impossible for the sand and grit in the water to injure it.

This machine has been thoroughly tested in the last two seasons by such well-known large producers as the Des Moines Sand and Fuel Company and the Capital City Sand Company, both of Des Moines, Iowa. The former company had previously used from three to five men to pick their gravel, so that they paid for the machine in a very short time by doing away with the services of these laborers. The latter company, which



THE EAGLE STEEL TUB SAND AND GRAVEL WASHER

takes gravel from the river, avoided moving its entire plant at one time because of this machine, as the material which went into it was a gummy mixture of mud, sticks, leaves, and gravel, and the machine cleaned it so thoroughly that it passed the State Highway inspection.

The capacity of the Eagle sand and gravel washer is from 250 to 300 tons per day, and when a capacity in excess of this amount is required, the manufacturers recommend installing additional machines rather than increasing the size of the machine, as it has been designed the proper size for effective operation. The amount of water required depends on the nature and amount of foreign matter which is being removed. Ten horsepower is sufficient to operate one washer under all conditions.

Automatic Dump Bodies for Light Trucks

Clean, Automatic Dumping with Fool-proof Mechanism Made Possible

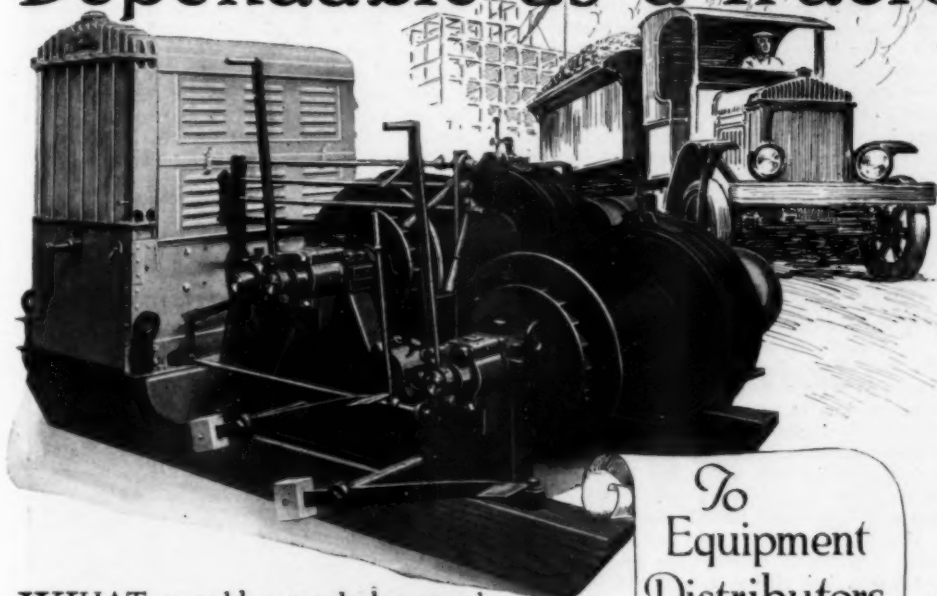


CLEAN DUMPING DONE AUTOMATICALLY

IT takes from 11 to 20 seconds to lift a batch-box from a car and dump it in a mixer skip, while the same operation of dumping can be performed by Superior automatic dump bodies in 1 second, according to the Superior Body Corporation, Marion, Ind., manufacturers of these bodies. The tail-gate latch is positive in action, adjustable, and entirely out of the way. It keeps the load in the body until the instant it is desired to release it, when the tail-gate opens as the body dumps.

This automatic action permits the operator to dump the body when loaded and return it to level position when empty without leaving his seat. If a cab is used, a cab control is provided. The body

Dependable as a Truck



WHAT would a truck be worth to you, without its modern transmission? Would one-speed trucks mean dependable haulage? You know they wouldn't! Then how about one-speed hoists?

The one-speed hoist is a "has been" . . . as completely outmoded by industry's present standards of efficiency as the one-speed truck! And the Mundy three-speed hoist, with sliding gear transmission, is here to stay!

This startling new Mundy de-

velopment means a change of speed, and line pull . . . in ten seconds flat! As adaptable to changing conditions of loads as the finest modern truck!

The story of the Mundy three-speed hoist is mighty interesting. Better ask us about it!

To Equipment Distributors

The New Patent Three-Speed Hoist is fully protected by patents in the United States and Canada

Some open exclusive sales territory is now available

The Mundy Sales Corporation

Distributors for the J. S. Mundy Hoisting Engine Co

30 Church St., New York

Agents in "Principal Cities"

TRADE MARK
MUNDY
ESTABLISHED 1869

MUNDY HOISTS

THE HOIST WITH THE ASBESTALL FRICTIONS

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automatically dumps by a slight forward pull on the locking lever, which automatically releases the catches locking the tail-gate, allowing it to swing open. The body is equipped with a stiff-leg which holds the body in dumping position until the driver is ready to bring the body to a level position, which he does by a steady pull on the lever provided for that purpose. The stiff-leg is attached to the sub-frame by springs that absorb the shock when the body is dumped. This eliminates any possibility of damage through chassis frame breakage.

The body itself is made of heavy-gage sheet steel in one piece, reinforced at each end with angle-irons, and the bottom reinforced with two heavy angle-iron sills to which the hinges are riveted. There are no chains used on the body, thus eliminating rattle and wear. When the body is mounted on the Ford chassis, it is not necessary to drill any holes. The body is simply set with its frame on the chassis frame, two U-bolts are put in the front, and four bolts through holes in the cross-member of the frame at the rear of the chassis frame.

A New Curb and Gutter Ditcher

Development of Standard Vertical Boom Ditcher Facilitates Work

A NEW curb and gutter ditcher for excavating for curb and gutter forms has been developed by the Barber-Greene Company, 485 West Park Avenue, Aurora, Ill. This machine will cut a trench 32 inches wide and 3 feet 6 inches deep at an average rate of 5 feet per minute. It has the same specifications as the standard Barber-Greene 44-B ditcher, except that it has a special curb and gutter boom with two bucket lines mounted in parallel. One bucket line cuts 21½ inches, and the other 10¾ inches.

The manufacturers state that in addition to being a profitable machine for curb and gutter work, since it is able to average 150 feet an hour through tough digging and often makes runs of 2,500 feet per day, it is believed that the machine will prove worth while for uncovering old pipe lines of various descriptions in street work as well as in other fields.

Sullivan Moves Spokane Office

THE Sullivan Machinery Company, 162 South Michigan Avenue, Chicago, Ill., has announced the removal of its northwestern sales office at Spokane, Wash., to 120 South Lincoln Street, Spokane. The change provides larger quarters, and the offices, display room, and warehouse will be together at the new location, with Robert T. Banks as Manager.



NEW BARBER-GREENE DITCHER IN ACTION

A New Squeegee Machine for Paving Work

A Decided Improvement on Hand Squeegeeing Is Effected



THE NEW LITTLEFORD SQUEEGEE

A NEW squeegee machine for applying bituminous fillers has been developed by Littleford Brothers, 485 East Pearl Street, Cincinnati, Ohio. This device, shown in the accompanying illustration, can be used equally well on all kinds of brick or block paving, wood block floors, etc., or for applying asphaltic seal coat. It is said to be very economical to operate and makes a neater joint than the old method of hand squeegeeing, in which much of the material was wasted by uneven spreading.

The Littleford squeegee machine consists of a hopper having a capacity of 12 gallons, mounted on two small wheels to which is attached a convenient handle. A quick-acting valve with a handy

The Okmulgee Transportation Co., Okmulgee, Okla., put a GMC to work January 1, 1924. During a period of 2 years and 5 months it ran 110,880 miles with the loss of only one day, running 18 hours a day, 7 days a week. That's reliability.



These features insure unusual **Reliability** in GMC Trucks

The ability of GMC Trucks to haul their loads, day after day and year after year, *with a minimum loss of time* is the direct result of General Motors great engineering and manufacturing facilities, plus years of experience in truck building.

Improved wear-resisting, removable cylinder walls and positive high pressure lubrication to all bearing points in the engines; oversize transmission gears and shafts; oversize universal joints; oversize axles; pressed steel frames; springs of finer steel; electrical wires encased in wet-proof conduits:—

These are but a few of the reasons for the *unusual reliability* of General Motor Trucks.



GM. G.M.T. '0-1926

Sold and Serviced Everywhere by Branches, Distributors and Dealers of
GENERAL MOTORS TRUCK COMPANY
Pontiac, Michigan

A DIVISION OF YELLOW TRUCK AND COACH MANUFACTURING COMPANY

GMC 1, 1½ and 2½ ton trucks	GMC Big Brute 3½ and 5 ton trucks
GMC Big Brute 4 to 15 ton Tractor Trucks	Yellow Cabs Yellow Coaches
Yellow Light Delivery Trucks	Hertz Drivurself Cars

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control rod discharges the hot material directly in front of the curved wiper blade in quantities as needed. This blade has a spread of 25 inches. It is made of heavy rubber and is reversible and adjustable for wear. The machine is small and light enough to be handled by one man, and when

operated it is held so that the entire weight of the outfit is supported on the wiper blade. The small wheels are required only when turning the machine around or when it is moved on and off the job. This machine has greatly speeded the application of asphalt to wood or brick blocks.

A New 1-Ton Truck

Heavy-Duty Service with Light-Weight Truck Made Possible

CONTRACTORS will be interested in the new G-Boy truck which is now being offered by Graham Brothers, Inc., Detroit, Mich. Among the advantages attributed to this new truck are rapid acceleration, an excess of pulling power, new heavy type transmission, sturdy frame and axle, comfortable riding qualities, light weight, and attractive appearance. The G-Boy truck was designed with a view to greater ease in handling and for loading and unloading, especially where loading docks are not available. This has been accomplished at no sacrifice of the generous body capacity. The truck is gracefully low, with steel spoke wheels and demountable rims, and is equipped with 30 x 5 cord tires.

The standard production includes panel canopy, screen canopy, carryall, express, and stake bodies. This truck fills a need for light delivery operation as well as for capacity duty. It is well adapted



THE NEW GRAHAM BROTHERS G-BOY TRUCK
WITH STAKE BODY

for all forms of delivery work and has a turning radius of 25 feet, making it possible for the operator to handle his truck with ease in business as well as residential thoroughfares and on construction projects.

7-S Mixers on Crosswise Trucks

New Arrangement Makes for Larger Daily Output

ANNOUNCEMENT has recently been made by the T. L. Smith Company, Milwaukee, Wis., that its non-tilting 7-S mixers can now be furnished on crosswise trucks for end discharge like a paver. This arrangement is most



SMITH 7-S NON-TILTING MIXER EQUIPPED
WITH CROSSWISE TRUCKS FOR END-DIS-
CHARGE AS ON A PAVER

satisfactory where the job is strung out, as in conduits, sewer, curb and gutter, and grouting work and in sidewalk and alley paving. A larger daily output is assured because time and handling are saved by delivering mixed concrete directly to the forms.

The standard wheels and axles are removed intact and installed on the crosswise frames. The standard frame is arranged to be bolted to the new unit. A hauling stub, telescoping under the skip, is used in place of the standard.

The stationary spout allows ready placing of the concrete directly into the forms, but an 8-foot distributing spout with a swing of a half-circle can be furnished if desired. The distributing spout with the two discharge points allows accurate placing of the concrete.

*Contractors' & Engineers' Monthly
helps you to overcome all doubts when
purchasing. Consult the Where to
Purchase Section.*

Gasoline into Gold!



Reduced Prices
Effective June 15, 1936
F. O. B. Peoria, Ill.

Sixty Standard	\$5,000
Sixty Cruiser	5,075
5-Ton	3,250
2-Ton	1,850

F. O. B. San Leandro, Calif.

Sixty Standard	\$5,000
Sixty Cruiser	5,075
Thirty	3,000

The possession of "Caterpillar" equipment helps the contractor to get the job—it's visible evidence of his ability to do the work better, quicker, cheaper.

Because of the power of "Caterpillar" Tractors, the public benefits. The detour sign comes down quicker—there is less delay and inconvenience in any task of earth-moving.

And it's "Caterpillar's" low cost of operation that so happily widens the contractor's favorable margin between cost and income.

CATERPILLAR TRACTOR CO.

Executive Offices: San Leandro, California, U. S. A.

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BEST C. L. Best
Tractor Co.

Successor to

The Holt Manufacturing Company **HOLT**

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An Adjustable Shore with a 4,000-Pound Working Load

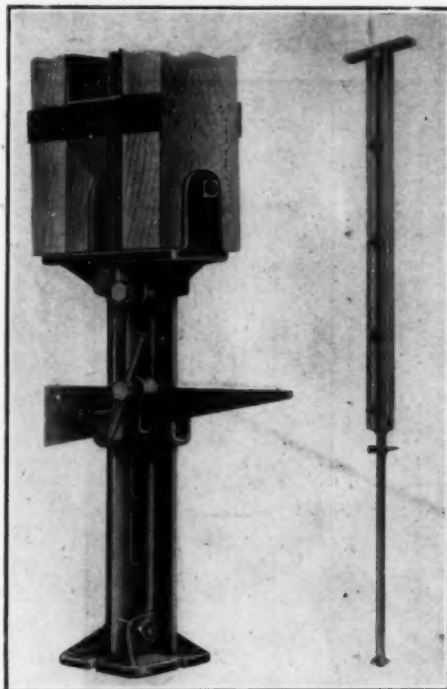
Unit Weighs Only 57 Pounds and Has a Range of Adjustment from 8 Feet to 14 Feet, 6 Inches

AN adjustable shore which eliminates all special tools and which can be completely placed or released with a carpenter's hammer and locked with a sixpenny nail, is manufactured by the M & M Wire Clamp Company, 2 Fifth Street, S.E., Minneapolis, Minn. This shore has a 4,000-pound working load with a factor of safety. It weighs only 57 pounds and has a range of adjustment from 8 feet to 14 feet, 6 inches. The manufacturers state that the shore will actually lift a load in excess of 1,000 pounds by driving the wedge with an ordinary carpenter's hammer.

The working parts of the shore consist of a simple wedge and a set screw. Once the shore is set up accurately, it stays put and there is no back lash or settling to take up the load. The 2 x 4 head frame is strap-braced with four 12-gage strap braces that do not interfere with any braces which are nailed to the shore to brace the shores. Also, the strap braces do not cause rocking when the shores are piled. The base member also can be braced as desired.

By the use of these shores no cutting, measuring, scabbing, or splicing is necessary. They will hold both ways, as two wedges can be used so that the shore can be locked from moving either up or down. The manufacturers state confidently that the M & M adjustable shore can be placed and locked, raised or lowered, released and taken down in less than one-half the time of any other type of shore and by one man alone. These shores can be erected upside down or inclining at any angle.

When the M & M shore is collapsed and is going to be hauled or piled, the wedge can be put in the bottom hole and locked with a screw cap, or it can be attached to the shore with a short piece of wire. By putting a piece of wire in the bottom hole and twisting the wire, the shore cannot be extended when handling.



ADJUSTABLE SHORE FOR CONCRETE WORK
At left, detail showing method of wedging shore at any desired height. At right, shore extended to full length

These shores can be used not only as shores for concrete forms but as braces where extension braces are needed to brace up form work. It can be set up back of door openings, and braces can be run from the shore to hold the wood bucks in position while the bricklayers lay up the tile walls to the wood bucks. They may be also used on wide ditch work as trench braces.

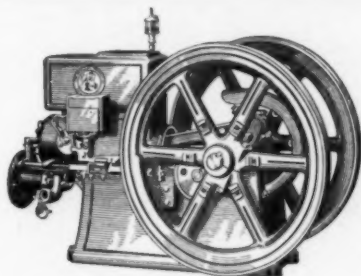
What the Division of Simplified Practice Has Accomplished

IN the 55 completed simplifications carried on by the Division of Simplified Practice, Department of Agriculture, the grand average elimination runs so close to 80 per cent that it is a perfectly safe statement that "80 per cent of the business is done in 20 per cent of the variety offered." Especially is this true when it is considered that many of these simplifications represent initial effort. Further elimination will undoubtedly lift the grand average.

A recent audit of eleven recommendations shows that the average percentage of adherence or de-

gree of observance of the recommendations is 82 per cent. In these lines, from 64 to 99 per cent of last year's output was in accord with the simplified lines.

Savings estimated by leaders in different fields range from one million dollars per year in paving bricks to two hundred million dollars per year in lumber. The actual dollars and cents values of simplification are difficult to get at. It will be interesting to learn from readers of *CONTRACTORS' & ENGINEERS' MONTHLY* just what simplification has saved in individual cases.



“—the best man we have on the job!”

So says a builder of good roads who owns one of the hundreds of thousands of Hercules Engines that are today serving with satisfaction and profit. He continues:

“It is pumping water for the men, the mess house and 16 head of horses and has not taken a lay-off yet. The men are strong for this engine because they know what it can do and because any one of them can start it easily.”

For more than a quarter of a century, Hercules Engines have been used by contractors wherever their work demanded a specially reliable type of power. Upwards of 400,000 Hercules engines have proved the

perfection of their design, the practically indestructible quality of their materials and the precision of their manufacture.

Makers of various types of contractors' machinery long ago recognized the superiority of Hercules engines, with the result that today the best known concrete mixers, graverscreens, hoists, conveyors, pumping units, compressors, saw rigs, paint sprayers and woodworking machinery are powered by Hercules.

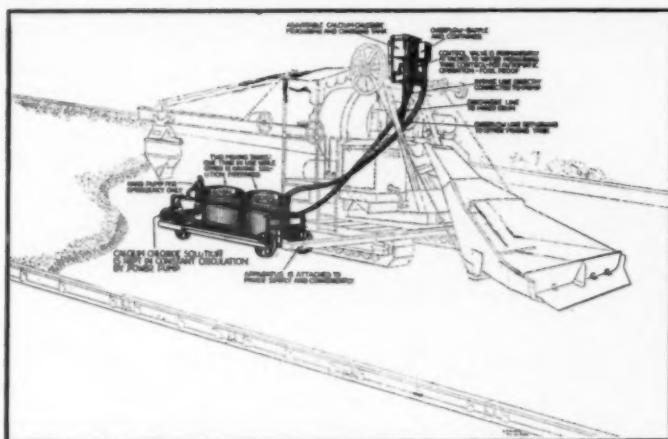
Buy with perfect safety the products equipped with Hercules Engines. That is the sure way of adding to your force the best man you have ever had on the job.

THE HERCULES CORPORATION, Evansville, Indiana, U. S. A.
Established 1894



HERCULES ENGINES

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**BLAW-KNOX
CALCIUM CHLORIDE
MIXING,
MEASURING AND
CHARGING MACHINE
MOUNTED ON
PAVER**

New Unit Supplies Calcium Chloride for Mixing-Water

Automatic Regulation and Injection of Correct Amount of Solution for Each Batch of Concrete Mixed

THE purpose of a new calcium chloride machine which has been developed by the Blaw-Knox Company, Pittsburgh, Pa., is to meet a new specification which has already been issued in several states and which is spreading very rapidly on highway work, as well as on all types of general concrete construction. A definite amount of calcium chloride is required in each batch of concrete to effect proper curing with greater speed and economy. Calcium chloride has a natural affinity for water, and holds it, giving up the water slowly over a long period of time.

The use of a calcium chloride solution in the batch eliminates the lengthy curing processes, such

as covering the concrete with earth or straw, ponding or continual wetting. It produces a high, early strength in the concrete, and pavements can be opened to traffic in less time with a reduction of at least 25 per cent in the curing cost.

Automatic regulation of injection of the correct amount of calcium chloride solution into each batch of concrete is accomplished by the Blaw-Knox calcium chloride mixing, measuring and charging machine. Only one additional man is required to prepare the solution and to handle the bags of calcium chloride. The machine is mounted on four wheels for easy transportation with the work, and is attached to the paving mixer.

The Poor Builder

THE building laws promulgated by King Hamurabi, twenty-two hundred years before the birth of Christ, were brief but pointed. They were seldom evaded, because the penalty was severe and certain.

A translation made by R. F. Harper reads as follows:

"If a builder build a house for a man and do not make its construction firm, and the house which he has built collapse and cause the death of the owner of the house—that builder shall be

put to death.

"If it cause the death of the son of the owner of the house—they shall put to death a son of the builder.

"If it cause the death of a slave of the owner of the house—he shall give to the owner of the house a slave of equal value.

"If a builder build a house for a man and do not make its construction meet the requirements, and a wall fall in, that builder shall strengthen the wall at his own expense."

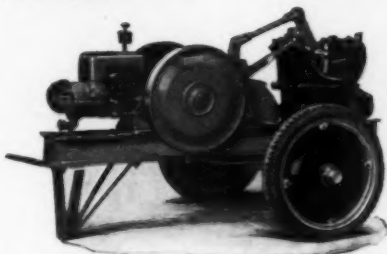
Big Foundation Built for New Skyscraper While Old Building is Being Demolished

WHEN Bradford L. Gilbert designed New York City's first structural steel skyscraper, the Tower Building, in 1882, there was considerable controversy about the power of its elevators to rise to the full height of its ten stories, as well as the practicability of the entire design. It was built on a plot so narrow that to put up the usual brick walls would have left offices so small as to be unrentable. Mr. Gilbert

conceived the skeleton plan and, despite the scaffolding, the building went up and builders learned something new. A revolutionary type of building was created which has made possible all the tall structures of the last forty years.

On the site of this first steel skyscraper another innovation is being successfully prosecuted. Although the method of building the foundations themselves is not new, a scheme has been devised

LAUSON "Quality" Diaphragm Pumping Units



The Jack

Fully Enclosed Gears Run in Oil

Built like a high grade transmission. Hardened gears; high grade bronze bearings. Drives direct from crankshaft—no chains.

Trucks

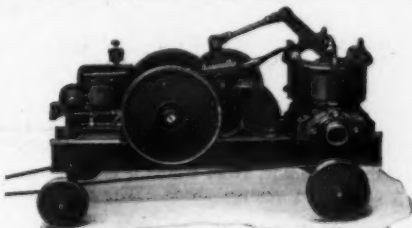
Cushion Tire Trailer or Iron Wheel Trucks as preferred. The pictures speak for the sturdy construction of these trucks.

Write for Circular on Full Line.

Furnished complete with make of pump desired or without pump but provided with connections for installing leading makes.

Complete production of engine, jack and trucks in our own factory results in an exceptionally attractive selling price.

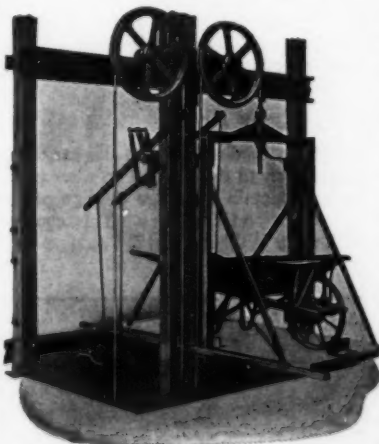
Powered with 2-H.P. engine for 3-in. pump; 2½-H.P. for 4-in. pump, or with electric motor. Engine is our famous Lauson. It develops a good surplus power.



We also manufacture full range mass Gasoline Engines, Concrete Mixers, Contractors' Road Tractors.

THE JOHN LAUSON MFG. CO., 11 Jackson St., New Holstein, Wis.

Save Money for the Builder with the **ZETTERLUND AUTOMATIC HOIST**



The above view shows arrangement at discharge level.

Easy to erect — saves time and energy — economical.

The Zetterlund Automatic Hoist saves the wages of an operator. Wheelers operate the hoist from the discharge level, operating the control lever just as easily and simply as signaling an operator. Hoist stops automatically at the floor level.

It can be extended to any height, and is guaranteed to give efficient service at 125-foot levels. Maximum load, 1,200 pounds—lifting speed, 175 feet per minute. The Zetterlund Automatic Hoist is efficiently propelled with a Le Roi engine.

It saves fuel, through an automatic gas control. Engine runs slowly until you are ready to lift. Acceleration continues until discharge level is reached, when it stops automatically. Guide posts can be used over and over again, as no nails are used in erection.

Parts can be quickly, simply and economically replaced. No brakes to wear out. No chance for the clutch to slip.

Safety dogs prevent danger from load dropping. Just as easy, simple, and safe to take a load down as to take it up.

Roller bearings reduce transmission losses to a minimum. They guarantee longer life to the Hoist. All pieces receiving hard wear are carbonized and hardened. Mounted on casters, it is easily and economically moved.

Manufactured by

Zetterlund Hoist & Machine Co.

128-132 Ferry Street

Milwaukee, Wis.

Excellent Distributor Territory Open

When writing to advertisers, please mention the Contractors' & Engineers' Monthly—Thank you.

whereby, while part of the old 50 Broadway Building is being demolished, the foundation for the new structure is being built at the same time. Five days before the last tenant was out of the old building, a steel caisson was driven into bed-rock beneath the building. At the same time the

wreckers were preparing for their work. Today nearly two-thirds of the piers are in place, although demolition has not quite reached street level. This method has saved several months in actual construction. The new building is to be 36 stories high.

New Paint-Spraying Equipment

Latest Development in This Economical Method of Applying Paint and Varnish

PAINt spraying is the modern economical method of applying paint and varnish to all surfaces. In painting any kind of devices or surfaces, time, material and labor cost are greatly reduced with the utilization of the proper gun or spray. The ease and simplicity of operation is an outstanding feature of the new Milburn paint spray made by the Alexander Milburn Company, 1416-1428 West Baltimore Street, Baltimore, Md.

The paint enters a large annular chamber surrounding the air-nozzle, from which it is atomized and expanded in a venturi shape. The atomization is complete and is regulated by a mere turn of the nozzle from a small to a large spray, or is entirely shut off, bringing into play a stream of air for dusting purposes, increasing the speed of the work. A pressure of 40 pounds is excellent but this can be varied to suit the work. Carbonic gas tanks are also employed with good results.

The thorough atomization of paint results in a complete even coverage of a greater surface with minimum paint consumption. The manufacturers state that one coat is adequate with the Milburn atomization principle where two coats are usually required by hand brushing. Air pockets and daubing are eliminated. Places impossible to reach by the brush can be painted with the spray.

The Milburn paint spray is light in weight, and compact, and employs a new simplified principle of construction which accounts for its absence of



THE NEW MILBURN SPRAY PAINT UNIT

moving parts and the absence of passages which are likely to clog. It consists of a rugged cover, body, atomizer, and convenient handle. There are no small parts to get out of order or to adjust.

One-Man Graders to Maintain Michigan Roads

TO be ready for the extensive maintenance program in Michigan, the Michigan State Highway Department purchased two dozen Hadfield-Penfield one-man graders manufactured by the Hadfield-Penfield Steel Co., Bucyrus, Ohio. The accompanying illustration shows this fleet of

graders ready to be distributed to the various districts in Michigan to do their bit in the campaign to constantly maintain the large mileage of earth and gravel roads and shoulders. This equipment was sold through William Ford & Co., distributors, Detroit, Mich.



LINE-UP OF HADFIELD-PENFIELD GRADERS FOR USE ON MICHIGAN HIGHWAYS

ONE MAN- Not A Gang!



ONE salary—not a payroll. That's H. P. economy.

The H. P. "One Man" Grader with attachments effects a saving of as high as 80% of road cost in scarifying, scraping and rolling which is done in one operation.

With our Rigid Rail Tracks the tractor becomes a powerful crawler that will not balk at obstructions.

Equipped with rubber wheels the Grader becomes a highway "patroller" of remarkable economy, speed and utility. Every part of a H. P. Grader is

built to stand the great strains imposed in road work.

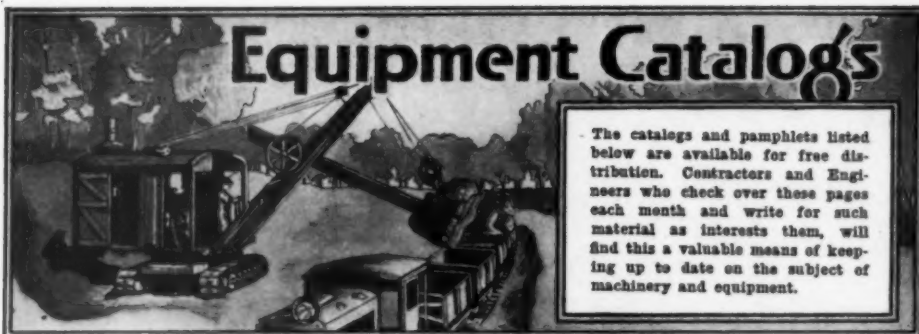
As the development of the H. P. "One Man" Grader has been based upon the collective experience of highway officials, contractors and engineers, it represents a distinctly advanced type of equipment.

Handy controls enable "One Man" to maneuver the H. P. "One Man" Grader on any kind of ground all day without tiring.

Write for our interesting literature today.

GRADERS—DU-PAT SCRAPERS—H. P. and CAHL TRACKS

THE HADFIELD-PENFIELD STEEL CO.
BUCYRUS, OHIO



Equipment Catalogs

The catalogs and pamphlets listed below are available for free distribution. Contractors and Engineers who check over these pages each month and write for such material as interests them, will find this a valuable means of keeping up to date on the subject of machinery and equipment.

A 1928 GOOD ROADS CATALOG

In the 1928 edition of "Everything for the Road Maker" the Good Roads Machinery Co., Inc., Kennett Square, Pa., presents an exhibit of equipment for economical highway building and maintenance, covering all types of graders, drags, scarifiers, crushers, screens, elevators, unloaders, etc.

A PAVEMENT BREAKER THAT CUTS COSTS

By using the Hardscoeg pavement breaker, it is claimed, costs can be cut 60 to 75 per cent and the average man who will cut out 75 linear feet of concrete or asphalt 3 to 6 inches in depth in a day by hand can cut out approximately 625 linear feet with this tool. This remarkable tool is described completely in the literature of the Hardscoeg Wonder Drill Co., Ottumwa, Iowa.

HIGH-GRADE ASPHALT DELIVERED PROMPTLY

To a contractor who has been awarded a paving job, delivery of his materials is a major consideration. Information as to how the Asphalt Sales Dept. of the Texas Co., 17 Battery Pl., New York, is prepared to make prompt deliveries, may be secured on request.

LOW FIRST AND LAST COSTS ON TRUCK AND TRAILER CRANES

A new booklet, 635-X, issued by the Harnischfeger Corp., 3819 National Ave., Milwaukee, Wis., describes the P. & H. mobile truck or trailer crane with quality construction and long life, which are inherent in all P. & H. equipment.

ROCK DRILLS FOR CONTRACTORS

The Gilman Mfg. Co., East Boston, Mass., in its Bulletins 100, 101, and 102, describes respectively hand-held rock drills, mounted rock drills and rock drill steels, air and water hose, hose couplings and fittings, all of sturdy and reliable construction, built especially for the hard service which contracting demands.

IMPROVING OLD PAVEMENTS

Contractors can do much to sell the idea of repaving. In many cities old pavements can be used as foundations for new and slightly paving. Stanolind paving asphalt, which makes a fine sheet asphalt that can be laid directly on old waterbound macadam or gravel streets, is described completely in literature which may be secured from the Standard Oil Co. of Indiana, 910 S. Michigan Ave., Chicago.

AN AUXILIARY TRANSMISSION FOR FORDS

The Warford auxiliary transmission, which adds more speed or more power as needed to a Ford truck and which lengthens the life of this hauling unit, is described completely in a series of illustrated folders which may be secured from the Warford Corp., 34 Whitehall St., New York.

A ONE-MAN POWER SHOVEL

The Universal power shovel, operated by one man and adapted particularly for excavating, general contracting and road building, and quarry operation in clay and gravel pits, and which is run by the Fordson, is described in illustrated circulars which may be secured from the Universal Power Shovel Co., 15841 Second Blvd., Detroit, Mich.

A NEW STEEL MAST HOIST

A steel mast hoist for use in placing concrete, which incorporates most of the advantages hitherto possessed only by steel tower plants, is described completely in the literature of the Insley Mfg. Co., Indianapolis, Ind.

A 7-S MIXER OF OUTSTANDING VALUE

The Koehring Dandle 7-S mixer, with improved features of design which provide fast operation and greater economy on the job, is described completely in a new illustrated 24-page booklet which may be secured from the Koehring Co., Milwaukee, Wis.

OIL-BURNING ASPHALT EQUIPMENT

Aerol smokeless asphalt-melting kettles, lead-melting furnaces, patrol patching heaters, paving-tool heaters, pavement-surface heaters, sand-drying pans, as well as other asphalt equipment, all of which are oil-burning, are described in the illustrated catalogs of the Aerol Burner Co., Inc., Union City, N. J.

CRAWLER-TYPE ROAD TRACTORS

Bates road tractors, which are built by one of the oldest and most experienced crawler-type tractor manufacturers in the United States and which have low operating costs, are described in the catalog of the Bates Mfg. Co., Joliet, Ill.

A TENSION BRIDGING FOR FLOOR FRAMING

A new steel bridging for reinforcing wood floors and for floor framing has been developed in steel Tru-Tye bridging, which requires no nailing. It is manufactured and sold by the Blaw-Knox Co., Pittsburgh, Pa., being described in its literature.

A NEW MODEL BUCKET LOADER

The Barber-Greene Co., 485 Park Ave., Aurora, Ill., will be pleased to send specifications on the new Model 25 Barber-Greene bucket loader equipped with either gas engine or electric motor drive. This loader has a rated capacity of one cubic yard per minute in free-flowing material.

"THE GROUND HOG"—WORTH READING

The Marion Steam Shovel Co., Marion, Ohio, has just issued the first copy of "The Ground Hog," a magazine for shovel men. It is dedicated to the operators of power shovels, cranes, and draglines and is really readable.

REDUCING THE COST OF CULVERT PLACEMENT

A very interesting and instructive bulletin on a recommended method for jacking corrugated metal culverts through existing embankments, thus saving much of the cost of excavation, has been published by, and may be secured from, the Armo Culvert & Flume Mfrs. Assn., Middletown, Ohio.

ROAD AND STREET CONSTRUCTION

The illustrated booklets of Warren Bros. Co., Boston, Mass., tell all about Warrenite-Bitulithic paving, which is an asphaltic concrete pavement of the highest type, having inherent strength and durability.

A STRONG, WELL-DESIGNED ONE-MAN POWER GRADER

The new Wehr power grader, which has an 8-inch channel steel frame with 12 cross-members, a platform for the operator just back of the grader blade, and many other features, including lower price, is described in the latest literature issued by the Wehr Co., 532 30th St., Milwaukee, Wis.

FOUR- AND SIX-WHEEL TRAILERS

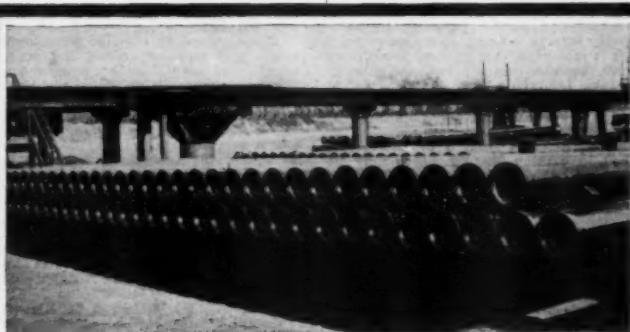
Heavy-duty trailers for moving road machinery and other heavy equipment at high speed are described in several illustrated folders issued by the Hercules Trailer Mfg. Co., 1327-1333 Santa Fe Ave., Los Angeles, Calif.

DIAPHRAGM AND HIGH-PRESSURE PUMPS AND AIR-COMPRESSORS

In Bulletin HC, both builders and general contractors will find information not only on Domestic gasoline hoists, but also on the well-known line of portable air-compressors, diaphragm pumps, and high-pressure road builders' pumps made by the Domestic Engine & Pump Co., Shippensburg, Pa.

A JACK THAT ALWAYS CONTROLS THE LOAD

The Pedersen Oiljak, on which ten tons can be easily lifted with one hand and on which the load is always under instant control, is described completely in the latest literature of the Oil Jack Co., Inc., 110 W. 40th St., New York.



deLavaud Centrifugal Cast Iron Pipe

*—is now ready to ship in
sizes from 4" to 20"*

The principal features of deLavaud Centrifugal Pipe are:

- 1—Lower cost per foot.
- 2—Greater carrying capacity due to larger inside diameter. Its smooth surface produces less friction.
- 3—An even greater resistance to corrosion owing to its finer granular structure.
- 4—Cheaper to install owing to its uniform lead space and self centering bell.
- 5—It is easier to cut and tap.
- 6—Its greater strength and uniform section make it valuable for use for higher pressures.
- 7—Adaptability to special joints due to its smooth exterior and uniform circumference.
- 8—It is made to be used with standard fittings and specials.
- 9—Annealing gives a uniform metal with no casting strains.
- 10—This method of casting leaves no possibility for sand holes or gas pockets.

Write for special literature covering manufacturing conditions and specifications of deLavaud Centrifugal Pipe.



United States Cast Iron Pipe and Foundry Company

SALES OFFICES

Philadelphia: 1421 Chestnut St.
Chicago: 122 So. Michigan Blvd.
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NEW STREET SURFACES LAID COLD

Kyrock, which may be used for patching or completely resurfacing city streets, making new streets from old ones, and which is laid cold, is described completely in the latest Kyrock booklet issued by the Kentucky Rock Asphalt Co., Inc., Louisville, Ky.

SINGLE, DOUBLE, AND TRIPLE-DRUM HOISTS

O. K. hoists, which are made in single, double, or triple-drum units, reversible or non-reversible, with or without boom swingers, in sizes from 3 to 130 horsepower, are described in catalog No. 26 which may be secured from the O. K. Clutch & Machinery Co., Columbia, Pa.

RELIABLE POWER-PLANTS FOR CONTRACTORS' EQUIPMENT

Contractors agree that dependable, economical power is vital to the satisfactory operation of industrial machinery. Stover engines, which are the result of 35 years of engine-building experience, are described in the free literature of the Stover Mfg. and Engine Co., 15 Lake St., Freeport, Ill.

ENGINES THAT MAKE CONCRETE MIXERS HUM

LeRoI engines, made from 3 to 15 horsepower by the LeRoI Co., Milwaukee, Wis., are described in literature showing how and why LeRoI engines have lower operating and maintenance cost within this range.

LOCOMOTIVES THAT SPEED UP THE JOB

Whitcomb locomotives automatically speed up the job because they are faster, having more horsepower per ton of weight, which gives faster starting and faster hauling. Bulletins completely describing all sizes and types from 2½ to 25 tons, may be secured from the Geo. D. Whitcomb Co., Rochelle, Ill.

CAREFULLY BUILT TAR AND ASPHALT HEATERS

Littleford tar and asphalt heaters, which for over 25 years have successfully withstood the use and abuse of the varying conditions which surround hot-material operations, are described in the complete catalog issued by Littleford Brothers, 455 E. Pearl St., Cincinnati, Ohio.

ALL KINDS OF CLAMPS FOR CONCRETE WORK

Targets which simplify the leveling of concrete slabs, wire clamps which save money on wall, beam and column forms, splicing clamps which save labor, lumber and nails, and other form clamps which require no special tools, are described in the literature and price list of the M. & M. Form Clamp Co., 2 Fifth St., S. E., Minneapolis, Minn.

BETTER WHEEL TRACTION

Before condemning any of the fine pieces of contractors' equipment on the market, look to the basis of traction—the wheels. Your tractor or grader is useless if the wheels of the tractor skid, slip, or spin. The use of Grid-Iron-Grip wheels, which embody the crawler principle in operation without reduction in speed, is described in the literature of the Tractor-Grip Wheel Co., 2405 Waterworks Drive, Toledo, Ohio.

TIMBER BRACE FITTINGS

The Duff Mfg. Co., Preble Ave., Pittsburgh, Pa., has issued a number of interesting pieces of descriptive illustrated literature covering the business end of a timber brace, composed of Duff non-breakable timber brace fittings.

A SENSIBLY SIZED MIXER FOR ANY JOB

The Boss One-Two bagger, which weighs no more and costs no more than other one-sack mixers and which handles one bag on a 1:3:6 mix or two bags on a 1:2:4 mix, is described completely in the latest catalog of the American Cement Machine Co., Keokuk, Iowa.

ENGINES WITH PRONOUNCED DEPENDABILITY

Hercules engines, which are always on the job, fair weather or foul, regular hours or overtime, handling standard work or excess load, and which are available for the operation of concrete mixers, woodworking and road-making machinery and other types of industrial equipment, are described in the catalog issued by the Hercules Corp., Evansville, Ind.

MIXERS THAT SET THE PACE FOR CONSTRUCTION

The Ransome Concrete Machinery Co., Dunellen, N. J., will be pleased to send complete descriptions of Ransome 14-S mixers, such as were used by the Southwestern Engineering Co. on the half-million-bushel Burrus elevator job at Dallas, where 3,000 cubic yards were poured in 154 hours.

A TRAILER DIAPHRAGM PUMPING UNIT

The Lauson trailer diaphragm pumping unit, with a specially designed jack driven by gears direct from the engine crankshaft, powered with the Lauson engine, and made in two sizes with a 2-horsepower engine for a 3-inch pump and a 2½-horsepower engine for a 4-inch pump, is described completely in the literature and price list of the John Lauson Mfg. Co., 11 Jackson St., New Holstein, Wis.

HAND- AND POWER-OPERATED DIAPHRAGM PUMPS

Rumsey pumps, including diaphragm pumps both hand- and power-operated and mounted on four-wheel trucks, are described in Condensed Catalog C-26 issued by the Rumsey Pump Co., Ltd., Seneca Falls, N. Y.

ALL-STEEL TRACTOR DUMP-WAGONS

Tractor dump-wagons made entirely of steel and having a 5-yard capacity and able to stand up under hard usage over the roughest roads, are described in Catalog M which may be secured from the LaPlant-Choate Mfg. Co., 3515 First Ave., Cedar Rapids, Iowa.

A THREE-SPEED ELECTRIC CABLEWAY HOIST

Sauerman Brothers, Inc., 464 S. Clinton St., Chicago, Ill., will be pleased to furnish to any interested contractors complete information covering the new Sauerman three-speed electric hoist for cableway work, which has greater loading power and higher inhaul speed and which is specifically recommended for clay digging and long-span operation.

THREE-SPEED HOIST A MONEY-SAVER

Complete information regarding the new Mundy three-speed gasoline and electric hoist which makes it possible for a contractor to handle all kinds of work, both high-speed and low-speed, with one hoist, may be secured from the Mundy Sales Corp., 30 Church St., New York.

A 10-TON, 4-CYLINDER MOTOR ROAD ROLLER

The Huber motor roller, which rarely uses more than 10 to 15 gallons of fuel and a quart of oil in a long day's run and which starts as easily as a motor truck, reverse direction without shift of gears and with a cushioned start, is described in detail in the latest literature of the Huber Mfg. Co., 305 E. Center St., Marion, Ohio.

PIPE EASILY LAID WITH ORDINARY EQUIPMENT

U. S. cast iron pipe, which is easy to handle with the ordinary equipment on the job, is described completely in the "United States Cast Iron Pipe Handbook," which may be secured by any interested contractor or engineer from the United States Cast Iron Pipe & Foundry Co., Burlington, N. J.

TIE BOLTS CUT CONCRETE WALL COSTS

Hawley tie bolts, which are placed in the forms from one side, requiring no one between the forms, and which may be used over and over, only rods being left in the wall, are described in an illustrated circular which may be secured from the Hawley Tie Bolt Co., 4715 Third Avenue, S., Minneapolis, Minn.

A CONTRACTORS' EXPOSITION OF 160 EXHIBITS

The Ford Power Equipment Exposition, Ford Motor Bldg., 54th St. at Broadway, New York, contains 150 exhibits of 80 manufacturers, covering the complete line of equipment available using the Ford or Fordson engine, parts, or tractor or truck as motive power or in its make-up. This Exposition is worth visiting. If you cannot visit it, information will be furnished you regarding it if you will write to the Exposition at the address above.

TRAILERS FOR THE CONTRACTOR'S EVERY NEED

The Highway Trailer Co., Edgerton, Wis., manufactures trailers with 2, 4, 6 and 8 wheels, from 1 to 50 tons capacity, in two types—one which handles machines such as shovels, cranes, rollers, trenchers, pavers, mixers, and compressors, and the other type for materials such as sand, gravel, stone, cement, lumber, pipe, and steel. These are described completely in literature which may be secured free on request.

AN AUTOMATIC HOIST FOR BUILDERS

The Zetterlund Hoist & Machine Co., 128 Ferry St., Milwaukee, Wis., will be pleased to send its complete descriptive literature covering the Zetterlund automatic hoist, which is a guaranteed money-saver for the builder, as the hoist saves the wages of an operator, being controlled from the discharge floor.

A NEW RAPID-ACTING MEASURING BATCHER

The Heltzel Steel Form & Iron Co., Warren, Ohio, has developed a new single-control batcher which performs the complete operation of filling, cutting off, dumping the batch of sand and stone, closing the lower and opening the upper gates in less than 10 seconds. Information may be secured direct from the company.

A GASOLINE SHOVEL WITH REAL BACKING

The first question to ask about any power shovel is: "What's back of it?" This question is very well answered by the reputation, service, and literature of the Erie Steam Shovel Co., Erie, Pa., manufacturers and backers of Erie Gas & Air shovels and cranes.

TRENCHERS AND DITCHERS

Any contractor having a trenching or ditching problem should write to B. C. Royce, Buckeye Traction Ditcher Co., Findlay, Ohio, and ask for copies of the latest Buckeye booklet on wheel and chain and bucket type trench excavators, pipe line trench excavators, tile and open ditchers, backfillers, pipe screwing machines, curb diggers, and clay diggers.



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Huge Sea-Wall in Harrison County, Mississippi

Built with CLIMAX Power

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The "Trustworthy" Engine

Last summer when Woods Bros. Construction Co. of Lincoln, Nebraska, was awarded the contract for constructing this 14-mile sea wall it was specified that the work was to be completed by August 31st of this year. That meant 14 miles in 14 months. In April of this year the work was already 45 days ahead of schedule. That's usually the experience when contractors are careful, as Woods Bros. were, to choose machinery equipped with Climax "Trustworthy" Engines.

- Raw Materials and Piles are handled at the Pile Plant by a Climax-equipped standard gauge 8 wheel 20-ton Brown Hoist Locomotive Crane.
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Here is just another bit of proof that when there's a big job to be done right and on time you can trust Climax Power to do it.

More than 30 Leading Manufacturers of contractors' machinery equip with Climax Engines.

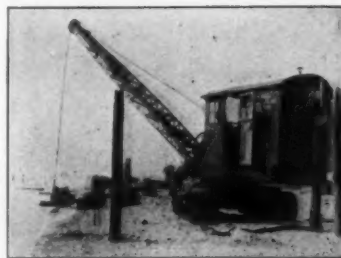
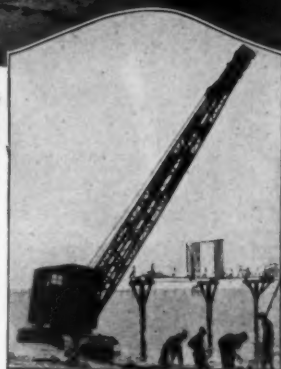
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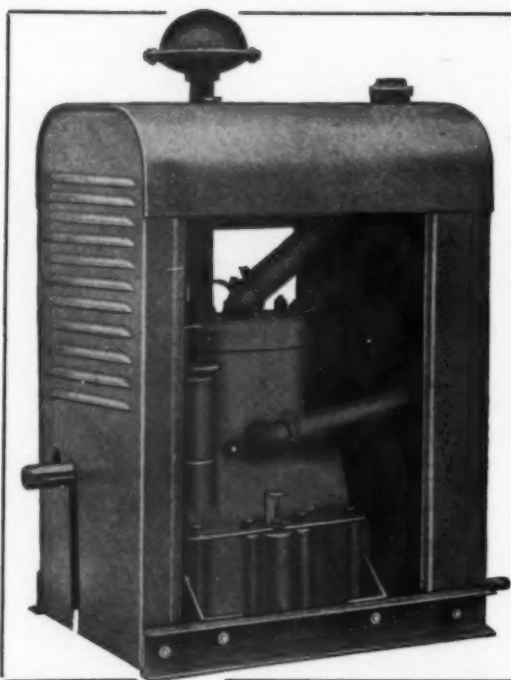
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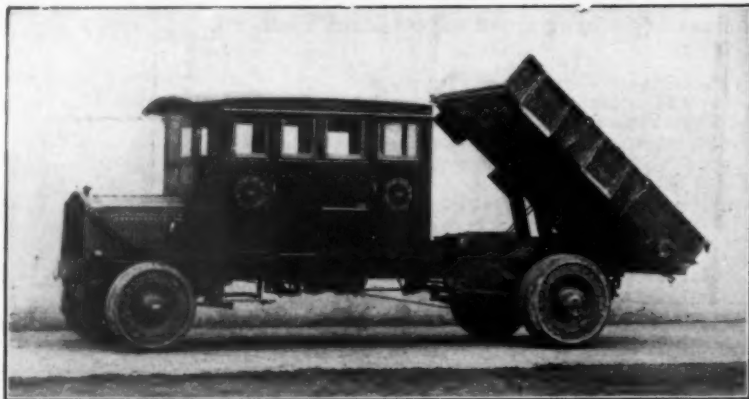
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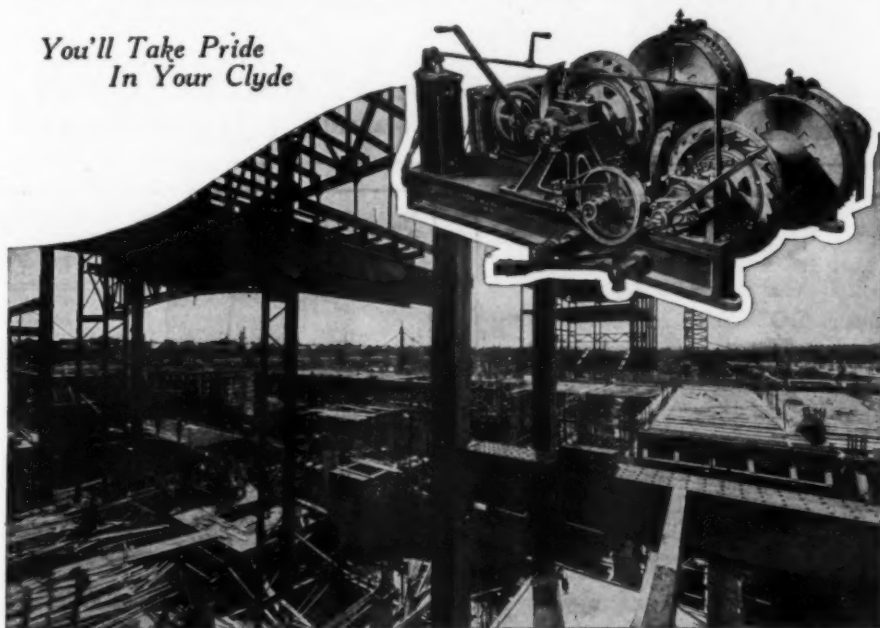
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Standard Hoists and Derricks
For the General Contractor
STEAM · ELECTRIC · GASOLINE · BELT

Below is shown the new Senior and Junior High School building under construction at Philadelphia. This is the largest school construction job in the East at the present time, the general contract amounting to nearly three and a half million dollars. Three double drum 40 H. P. Clyde Electric Hoists operate the three combination concrete and material towers. One hoist handles 3,000 lbs. at 300 feet per minute, the other two 6,000 lbs. at 170 feet per minute.

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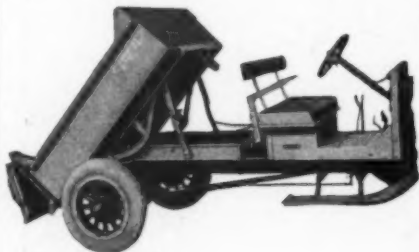
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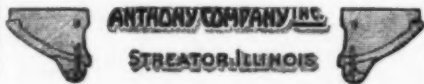
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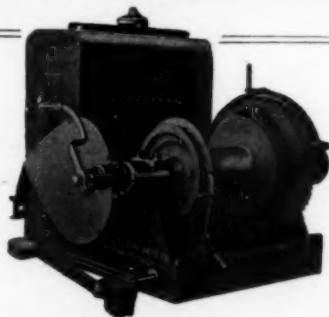
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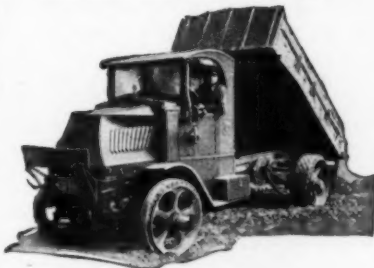
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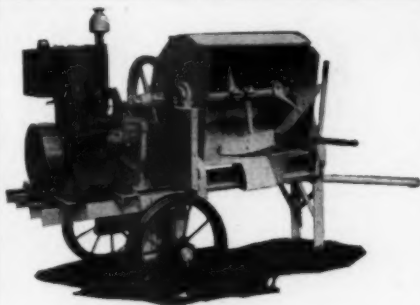
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By using one man to mix. By adding 10 to 12 shovels of sand over what your average is now. By a mixed plaster or mortar which will go 15 to 20% farther. By spreading what is now wasted as droppings. By getting more mixing done than you do now, thus cutting the cost of plasterers and bricklayers waiting for material.

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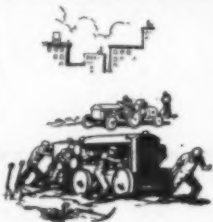
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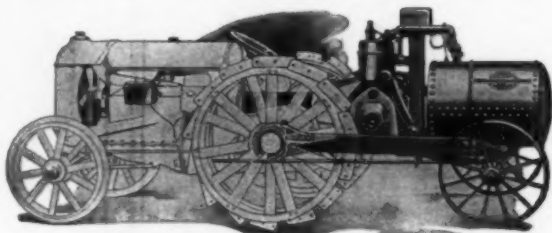
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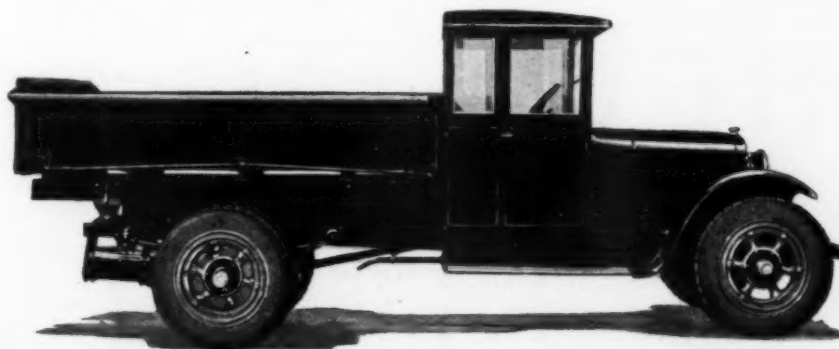
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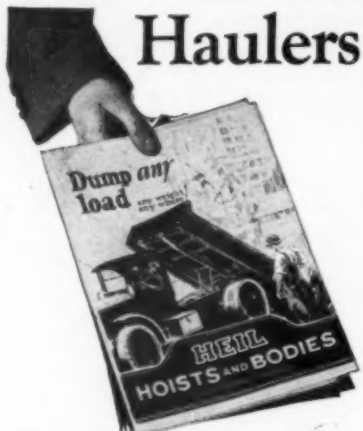
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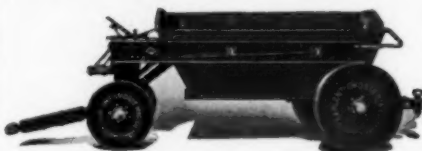
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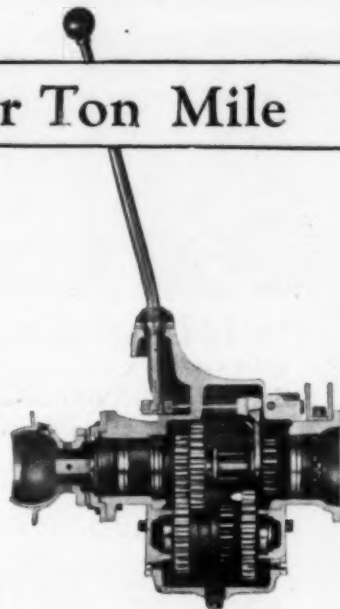
The net result of the Warford equipped Ford truck is lower cost per ton mile for every conceivable hauling job from two to four tons. Thousands of these trucks have replaced equipment costing many times as much.

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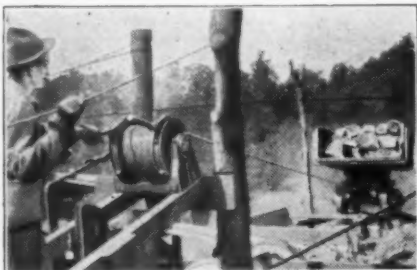
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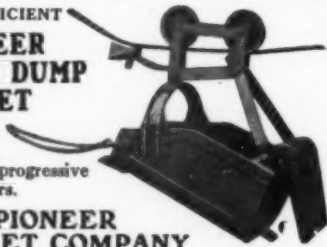
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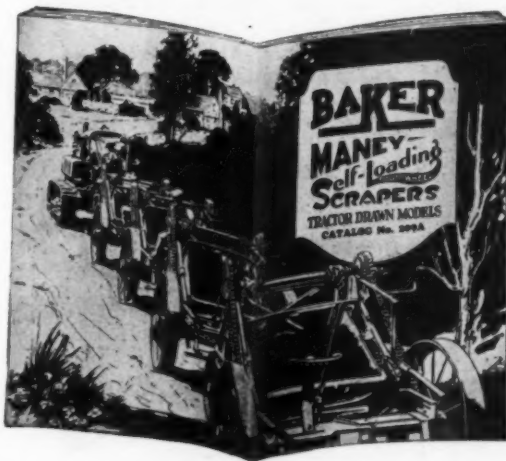
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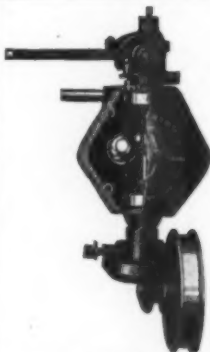
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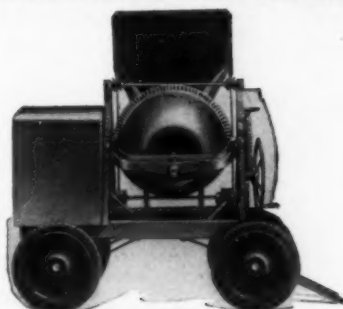


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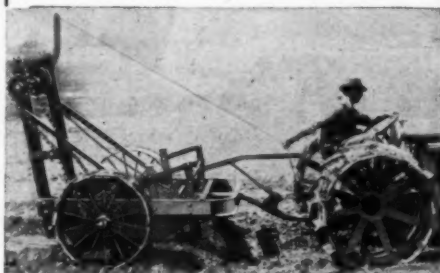
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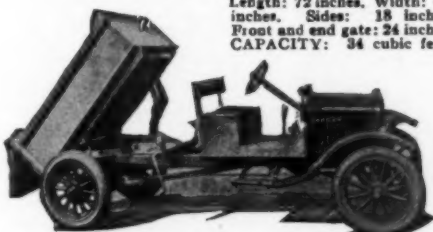
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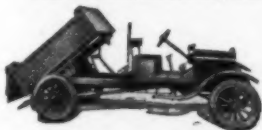
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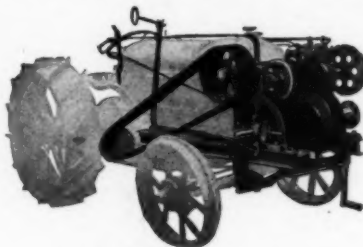
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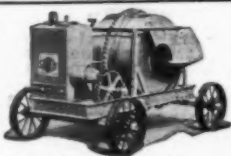
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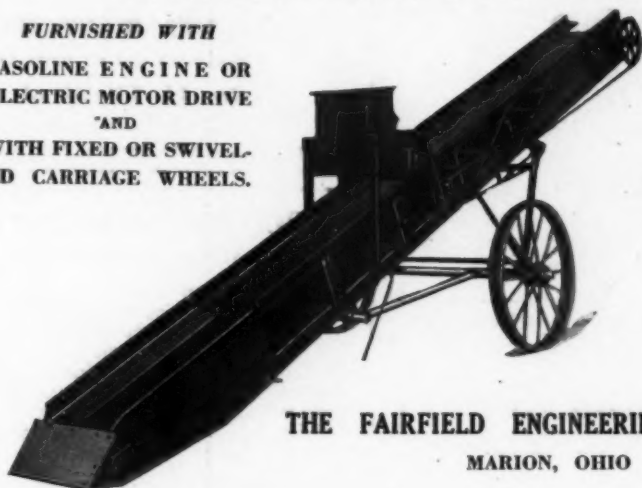
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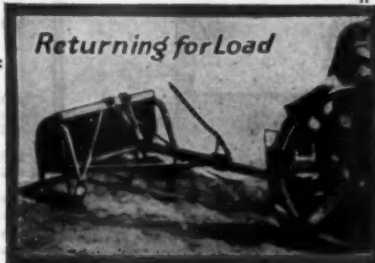
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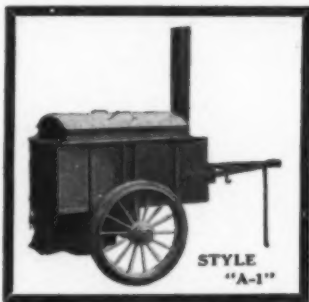
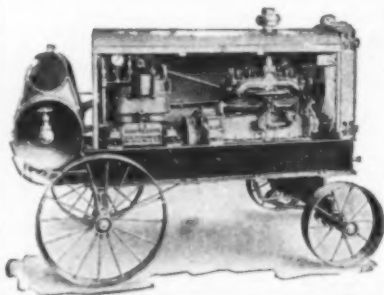
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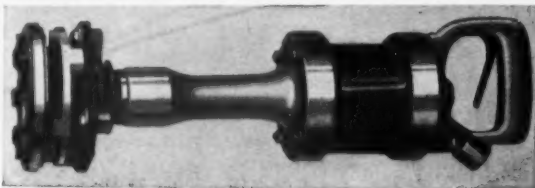
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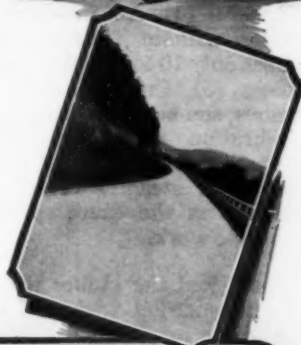
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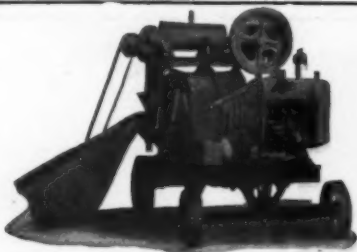
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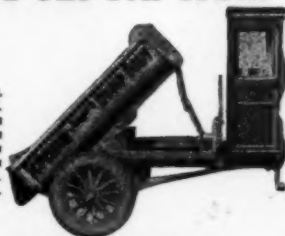
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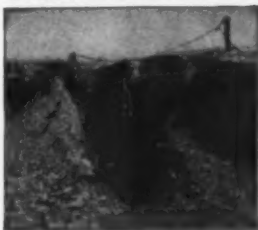
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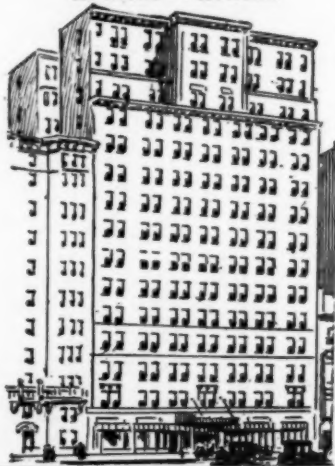
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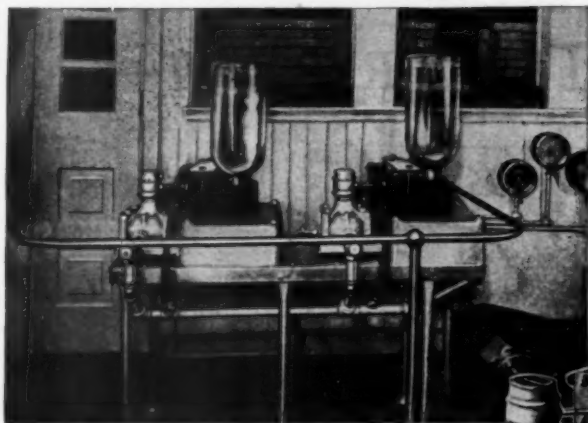
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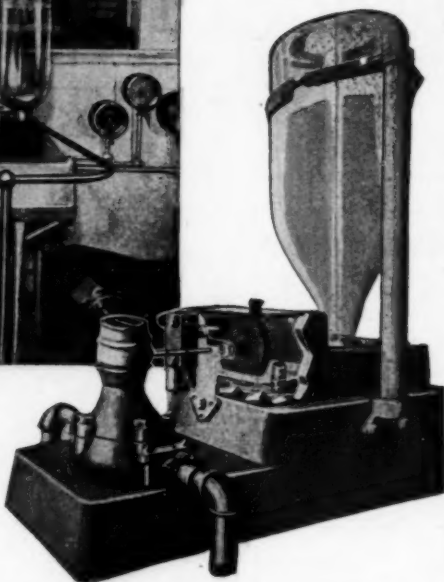
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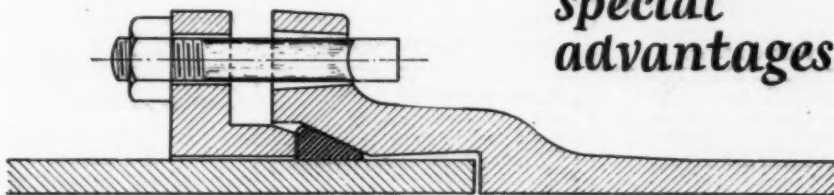


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The Tropic—An all-bronze Water Meter, with connection spuds attached to the lower case. Particularly designed for warm sections of the country.



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These two meters embody exactly the same mechanical features, the only difference being the changes necessary to provide a frost-breaking feature in the Arctic.

Either of these meters will be equipped with a **COMPLETELY ENCLOSED** intermediate train **RUNNING IN OIL**, if desired.

Write or wire nearest office for full information.

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BIDS WANTED

Sealed Proposals will be received by the Board of County Commissioners of Martin County, Florida, at the County Court House, Stuart, Florida, until 10:00 A. M., July 27, 1926, for the construction for steel cages for temporary County Jail.

Contractors are required to submit plans and specifications for the proposed work, to comply with the general plans on file in the office of the County Engineer, Stuart, Florida.

Certified check for two per cent of the amount bid is hereby required with each bid and a bond for the contract price will be required of the successful bidder, such bond to be a bond with a reputable and responsible Security Company as surety and written by a Company or Companies having as agents resident citizens of Martin County, Florida.

The Board of Commissioners reserves the right to reject any and all bids.

E. H. GIBSON,
County Engineer.

H. N. GAINES,
Chairman, Board of County Commissioners

LUFKIN ALUMINUM RULES IN 10ths and 100ths OF FEET.

SOMETHING NEW
FOR CIVIL ENGINEERS, SURVEYORS, HIGH-
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Accurate, Light Weight, Durable, Rust Proof.
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Daylight for 3 cents hour

Milburn No. 8 Light—8,000 candle
power—costs 3c per hour.

Extremely simple—uses any carbide.

Send for Booklet 223

THE ALEXANDER MILBURN CO.

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Note our Distributors on following pages.



Full automatic gravity dump body
for Ford one-ton trucks.

Durable -- Fast -- Positive -- Reasonable
Write for full information.

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Hagerstown, Maryland



Power for the Hauls of Industry!

The hauls of industry call for quickly responsive, flexible power to meet the unceasing demands of the day's work.

Continental Motors insure that power performance which is economically utilized in mills, railroads, lumbering, road building, bridge building, mining, agriculture and marine. For all of these Continental provides specific types of motors.

26 years of continued experience in building an outstanding quality product bearing the Red Seal Mark is the guarantee to the user of dependable, economical service from all Continental Motors.

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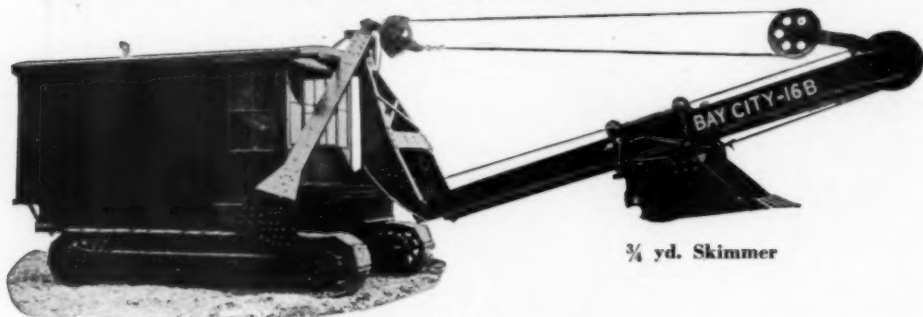
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DEPENDABLE POWER FOR EVERY PURPOSE

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POWER SHOVELS
CRANES BAY CITY, MICH.

When writing to advertisers, please mention the Contractors' & Engineers' Monthly—Thank you.

The geographical location of these distributors may be found by consulting the map shown on the two following pages.

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Distributors of Contractors' Equipment

THE following cards (arranged by states) show the names of dealers in contractors' equipment and supplies with a record of the various lines handled. Contractors will find this list a convenient means of getting in touch with dealers who make a point of giving satisfactory service and prompt shipments. This directory is constantly consulted by our subscribers and any suggestions regarding it will be welcomed. !

ALA.—ARK.—CALIF.

C. B. DAVIS ENGINEERING CO.

Brown Marx Bldg. Birmingham, Ala.

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CONVEYORS BUCKETS
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Aldrich Pump Company
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CLYDE — SASGEN—Derricks and Hoists
BLAW-KNOX—Curb, Gutter and Road Forms,
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RED STAR—Wheelbarrows and Concrete Carts
RED EDGE—Shovels and Picks
BARNES—Pumps and Compressors
NORTHWEST—Shovels, Cranes and Draglines
IDEAL—Concrete Block Machinery and Molds
CLIMAX — LEROI — FULLER & JOHNSON—
Engines
OIL PULL—Road Tractors
Also anything else a contractor uses

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921-927 Pioneer Bldg.

Birmingham, Alabama

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Loaders, The Ditcher With The Vertical Boom.
Easton Car and Construction Co.—Industrial Cars and Track-
Turntables, Roll Over Dump Bodies.
Lakewood Engineering Co.—Concrete Construction and Road
Building Equipment.
Nordberg Manufacturing Co.—Trackshifters, Shovelers.
Northwest Engineering Co.—Crawler Cranes, Draglines, Shovels.
Shaw-Enecks Co.—SHAWNEE Road Builder and Maintainer
Universal Crane Co.—Truckcranes.
Geo. D. Whitcomb Co.—Electric and Gasoline Locomotives.

The BROWN-BEVIS CO., Inc.

470 East Third Street
Los Angeles, California

DISTRIBUTORS

T. L. Smith Co.—Concrete Mixers, Pavers and Elevators
J. D. Adams and Co.—Adams Loading Wheel Graders.
Byers Machine Co.—Hoists, Cranes and Truckcranes
Wood Shovel & Tool Co.—Wood Molybdenum Shovels
Lakewood Engineering Co.—Concrete Placing Machinery and
Road Finishers
Geo. Hulse Mfg. Co.—Trackloaders and Conveyors
Barnes Mfg. Co.—Barnes Pumps
The Owen Bucket Co.—Clam Shell Buckets
The Buckeye Tractor Ditcher Co.—Curb and Trench Ditchers
Rex-Watson Corp.—Dump Wagons
Universal Crusher Co.—Crushers
Traylor Engineering & Mfg. Co.—Rock Crushing Equipment
Osgood Co.—Power Shovels
Four Wheel Drive Auto Co.

Member: Associated Equipment Distributors

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Novo Hoists, Pumps, etc.
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Shell Buckets
Thew Gas, Steam and Electric Shovels
Baker Backfillers and Unloaders
Archier Concrete Towers
Rex-Watson Dump Wagons
Red Edge Shovels and Picks
Akron Wheelbarrows
Carey Blastite Expansion Joint
M. & M. Form Clamps
Jones Superior Machine Co.

COAST MACHINERY CORPORATION

464 East Third St., Los Angeles, Calif.

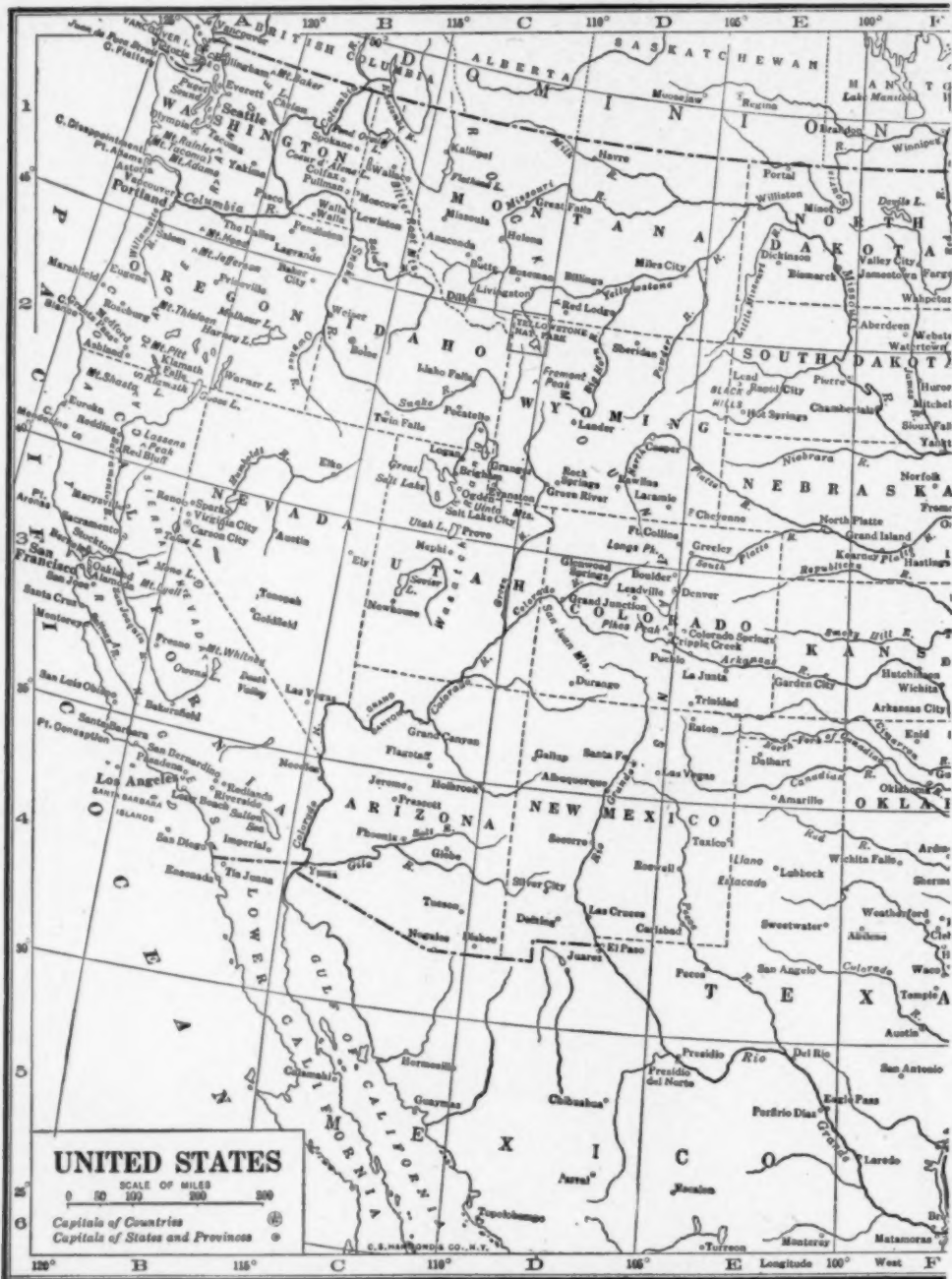
829 Folsom Street, San Francisco, Calif.

Representing:

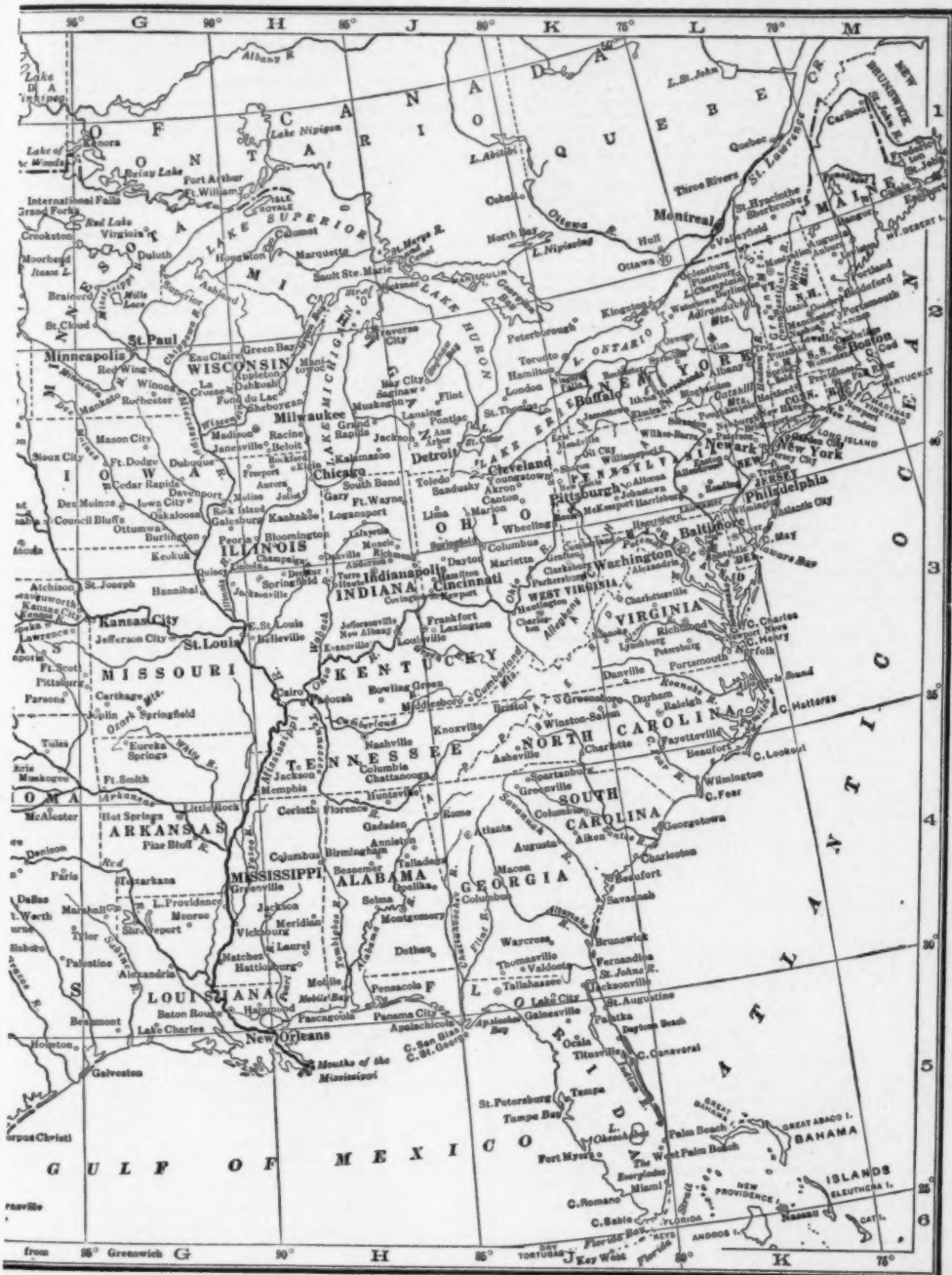
T. L. SMITH COMPANY—Concrete Mixers &
Pavers
OLIMAX ENGINEERING CO.—Industrial gas
engines
CUSHMAN MOTOR WORKS—Gas Engines
UNIVERSAL MOTOR CO.—Gas Engines
CONCRETE SURFACING MACHY. CO.—Con-
crete Surfacers and Finishers.
DEMING PUMP COMPANY—Pumps
HUMPHREYS MFG. CO.—Power Pumps
RALPH B. CARTER CO.—Diaphragm Pumps

When writing to advertisers, please mention the Contractors' & Engineers' Monthly—Thank you.

This map shows all the cities in the United States in which are located the distributors whose names appear in this directory.



Readers who notice the omission of names of any well-known dealers from this directory are invited to notify the publishers.



Collins-Kay Machinery Co.

438 E. 3rd St. Los Angeles, Cal.

Bay City Pdry. & Mach. Wks., Gasoline Truck
Cranes.

Clark Tractor Co., Truclifts and tractors.

Erie Steel Const. Co., Clamshell buckets and
aggregators.

Fate-Roth-Heath Co., Gasoline Locomotives.

Koppel Sales Co., Cars and rails.

J. S. Mundy Hoisting Engine Co., Steam, Electric
and Gasoline hoists.Northwest Engr. Co., Gasoline & full Diesel
shovels, draglines and cranes.

Northern Engr. Wks., Electric traveling cranes.

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vibrating screens and concentrators.**Essick and Company**

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LAKEWOOD ENGINEERING CO.

O. D. EDWARDS MFG. CO.

STANDARD STEEL WORKS

PEERLESS MACHINERY CO.

IDEAL CONCRETE MACHY. CO.

Concrete Machinery & Supply Co.

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Butler Bros and Batchers

Williams Buckets

Bex Concrete Mixers

National Hoists

Archer Hoist Tower & Spouting

Blystone Plaster and Mortar Mixers

Concrete Pipe Forms

Orton Cranes & Shovels

Continental Engines

National Pile Hammers

La Bol Engines

Red Star Wheelbarrows and Carts

Connaut Shovels

Domestic Pumps

Member: Associated Equipment Distributors

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ExcavatorsDomestic Eng. & Pump Co.—Pumps, Compressors,
EnginesSmith Engineering Wks.—Crushers and Gravel
Plant EquipmentThe Knickerbocker Company—Concrete Mixers
and Saw Rigs

Orr & Sombower, Inc.—Hoists and Boilers

McKiernan-Terry Drill Co.—Pile Hammers

Atlas Engineering Co.—Conveyors

Telephone, AXridge 1234

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American Saw Mill Machinery Company

Sagen Derrick Company

Construction Machinery Co., Waterloo, Iowa

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Cresson Morris Company

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Associated Mfr's. Gas Engines

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Mixers, Pavers, Towers, Spouting

Novo Engine Co.

Engines, Hoists, Pumps, Compressors

Blaw-Knox Co.

Steel Forms, Clamshell Buckets, Batch Plants

National Hoisting Engine Co.

Steam Pile Hammers

Steam Hoists

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The Foote Co., Inc.

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The Jaeger Machine Co.

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Mandt Co.

Mead-Morrison Manufacturing Co.

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Thew Shovel Co.

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Johnson Batch Hoppers
Jaeger Concrete Mixers
Oakland
Member: Associated Equipment Distributors

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Knickerbocker Concrete Mixers
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Baker Maney Self-Loading Four	P & H Shovels & Cranes
Wheel Scrapers	Ord Conc. Finishing Machines
Wheel and Drag Scrapers	McKiernan-Terry Pile Ham-
Red Edge Shovels	mers, etc.
Dump Wagons & Trailers	Killifer Road Rippers, Rotary
Red Star Wheelbarrows	Scrapers
Contractors Pumps	Barnes Pumps
Waukesha & Lefort Engines	Mundy Hoists
Koppel Cars & Trunk	Williams Clamshell Buckets
Freeman Trunk Turntables	Vulcan Industrial Locomotives
Hvass Street Flushers, Sweep-	Acme Rollers & Crushers
ers and Asphalt Plants	Hotchkiss Steel Forms
Rex Concrete Mixers & Pavers	Johnson Material Bins & Hoppers
	Schramm Air Compressors

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 Heltsel Steel Form & Iron Co.
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 Buffalo Springfield Keller Co.
 Domestic Engine & Pump Co.
 Sterling Wheelbarrows
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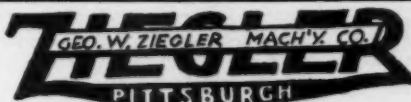
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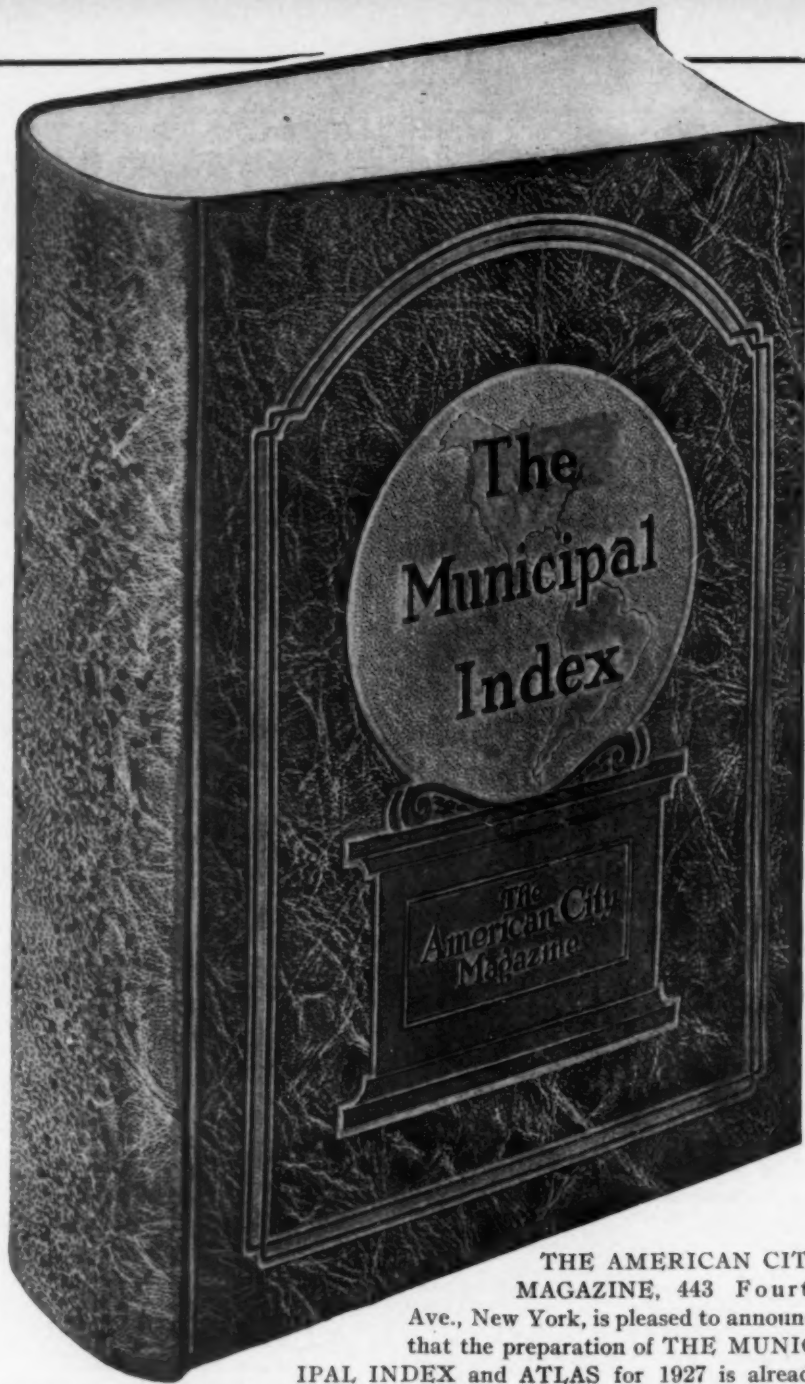
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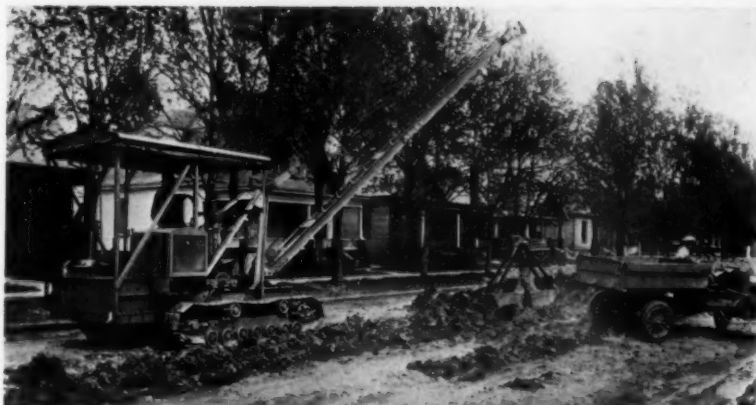
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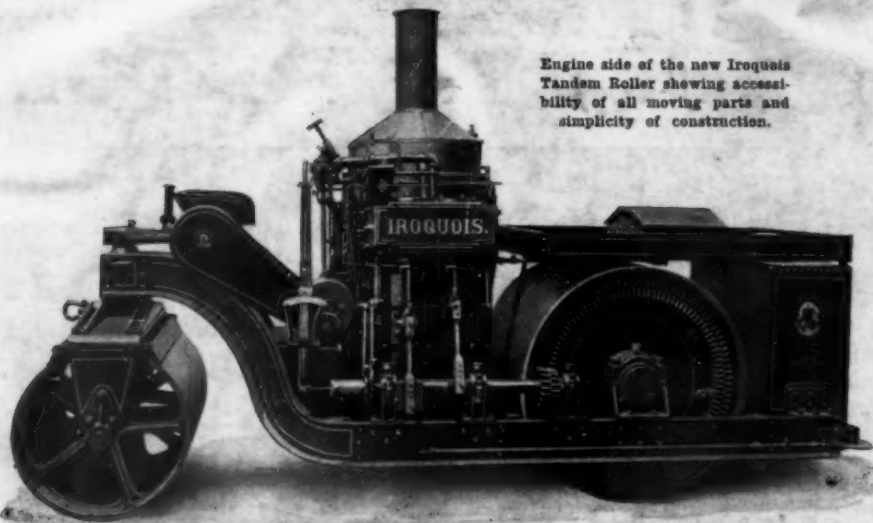


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